

MANAGEMENT OF MATERIALS— QUINTESSENCE OF PURCHASING

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To
My Parents

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PREFACE

The field of management of materials continues to be an area of complexities due to (i) the increasing complexity in organisation, (ii) the increasing size of the investments and increasing competition, and (iii) the increasing influence of economic conditions. The management of materials is a function towards organising the movement of materials, having appreciable bearing on efficiency and effectiveness. Buying is a problem, so are inspection, storing and distribution. All these now call for greater accuracy in taking decision after weighing the probable alternatives. We at the moment cannot manage the materials with our traditional tools and techniques—hence, in this book I have made an attempt to analyse the various essential features of purchasing and its relative activities which are very much in line with the present industrial purchasing and control with a view to reflecting the changes that are occurring, and the tools and techniques that are needed.

This book is based on a series of my articles published in the leading journals and financial dailies of the country, and has been revised and recast to suit the approach.

The whole book has been divided into four parts. Part ONE is introduction. It has four chapters. Chapter 1 deals with a few problems in the Management of Materials, Chapter 2 describes in brief the Organisational Pattern of the Materials Management, Chapter 3 proposes how to manage the Materials in Adverse Conditions, and Chapter 4 discusses the need of Availability Research on Materials—why and how it is to be done.

Part TWO examines the Purchasing Activities. It comprises Chapters 5 to 12 of the book. Chapter 5 deals with Development and Disposal of Purchasing Activities, Chapter 6 describes The Place of Buyer in Today's Industries, Chapter 7 discusses Product-Price Precalculation and Negotiation, Chapter 8 is An Approach to the Purchasing Activities, Chapter 9 suggests some Aids for Purchasing Activities, Chapter 10 deals with Selection of Right Source of Supply, Chapter 11 projects the strategies to be adopted in Vendor Development and Chapter 12 highlights the application of Research on Purchasing.

Part THREE presents Related Activities and it has two chapters, i.e., Chapters 13 and 14. Chapter 13 suggests Scrap

Minimisation and Chapter 14 deals with Management of Scrap, Surplus and Obsolete Materials.

Part FOUR is about Quality Stratagem. It consists of three chapters. Chapter 15 deals with Quality Management in Industry, Chapter 16 analyses Industrial Inspection and the last Chapter 17 suggests Controlling the Quality of Purchased Materials.

I hope this book will please the managers who are managing materials in industries and help the industrial management to take effective decisions on buying and controlling the materials.

I am grateful to the editors of the *Indian Management*—New Delhi, *Productivity*—New Delhi, *Productivity News*—New Delhi, *The Indian Buyer*—Calcutta, *Industrial Times*—Bombay, *The Economic Times*—Bombay, *The Financial Express*—Bombay, *Business Standard*—Calcutta, and the Chairman, Calcutta Chapter of Indian Institution of Industrial Engineering, for allowing me to reproduce my articles.

I then wish to express my gratitude to my wife Sukla, who constantly encouraged me in my work.

My thanks are also due to my friends and colleagues for their suggestions and help.

Perhaps the book could not have been presented in this form without the co-operation of my publishers, to whom I am greatly indebted.

B.K. ROY CHOWDHURY

Calcutta

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Part One

Introduction

MANAGEMENT OF MATERIALS— A FEW PROBLEMS*

Traditionally, people responsible for materials have looked at the "JOB" from the standpoint of efficiency—how to get the right material at right time and at right price. But, raw material crisis, oil price hike all over the world, etc., are tending to throw industries out of gear. On top of it, power crisis and irregularities in transport have made the position still worse. Until and unless unified actions are taken to face this challenge, all our plans and programmes will go in disarray affecting adversely the whole economy of the country. However, despite all the problems, the Materials Managers are no doubt trying hard to keep the industry moving.

The people who are working in the materials management sphere have, first of all, to make a substantial effort to procure quality materials at a reasonable price and then to store and distribute them with maximum efficiency.

The way technology is developing, it seems everyday is a new day. We at this moment are facing tremendous difficulties in keeping pace with this fast movement. Since we shall have to live with the practicability we shall have to see how best we can utilise our limited resources in a planned way at least to minimise the technological gaps which have already been created. For this the greater responsibility will have to be shared by the Materials Management personnel, as they are the people who are responsible to find out ways and means to fulfil this gigantic task.

Design and Specifications

The designers have a major role to play in easing the situation. The designers must keep in mind (when designing)

the availability of suitable raw materials and capabilities of the suppliers. The following should be considered in this respect :

(a) *Close tolerances.* It has now become a fashion to prescribe close tolerances. If anyone analyses the drawings of various components, he will observe that at least 80 per cent of the drawings have close tolerances and if further scrutiny is made then out of the 80 per cent, 50 per cent drawings call for close tolerances which as a matter of fact are not necessary for actual function. In the craze for close tolerance and precise workmanship, we forget that by this way we are not only paying much more money but also creating problems in the procurement of materials. The objective should be to manufacture components, sub-assemblies, etc., that are best suited, rather than those that rank highest in absolute quality. One thing which should be kept in mind is that the greater the accuracy, the higher would be the cost and difficulty in procurement.

(b) *Ambiguity in drawings.* Many a time it has been observed that due to ambiguity in drawings, the materials get rejected. There are different types of interpretations—one type of interpretation by the supplier and another type of interpretation by the purchasers' inspectors. This clash leads to rejection of materials or production of sub-standard materials. In any event, it is very important that a drawing is free from ambiguities and admits only a single interpretation. No supplier would like to see his materials rejected. At the same time, no buyer would like to purchase sub-standard materials. Hence to strike a balance one shall have to see how the best solution could be found out. This calls for co-operation between the purchasers and suppliers. Even if there is a slight indication of ambiguity or complications in the drawing, both the purchasers and the suppliers should sort it out and try to come to a point where materials could be fabricated with ease. The more widely this kind of co-operation is practised, the higher will become the quality level of industrial production. But in practical field it is not so quite often that the purchasing people have to face a situation in which either they have to make a compromise with the internal situation or they have to go all out to convince the suppliers to accept and rectify the supplies.

(c) *Inadequate specification.* The information on specifications given to the suppliers is often inadequate. This makes them repeatedly run about to get the necessary clarifications. The

drawing should have the following specifications :

1. Critical dimensions,
2. Finishing points,
3. Safety requirement,
4. Permissible reject levels in batches,
5. Packing requirement, and
6. Method of quality appraisal to be applied.

All the specifications mentioned above will be definitely helpful to the suppliers in fabricating the components of better quality and with a greater ease. Purchasing people will also have to see that their relations with their suppliers are constantly good so that simple matters do not pose any great problem. As a matter of fact, most of the purchasing people do not give the desired specifications, and this ultimately causes rejection and complications.

Insufficient Lead Time

It has been observed that due to insufficient lead time, suppliers, intent upon supplying material in the targeted time, fail to give sufficient care to the quality aspects. This not only causes difficulty to the suppliers, but also to the purchasers who have scarcely sufficient time to inspect the components required immediately for processing in their factory. This is a circumstance which, perhaps, each and every purchasing man must be facing. How best this can be solved is a matter of a company's policy and attitude. When a situation of this type arises, the purchasing people should constantly visit the suppliers' factory, see the progress, guide them in fabrication and inspect the processed parts at different stages of their manufacture. But unfortunately for want of time, purchasing people hardly get the chance to carry out the process smoothly and systematically.

Planning—Its Problems

That planning is the life force of any industrial house cannot be over-emphasised. But the planning people must take into serious consideration the forces and factors which often upset planning.

Most of the big factories have more or less installed generators to cope with the load shedding/power cuts. There is no doubt that they can run their factories during load shedding or power cuts—but what about other thousands of small-scale units

at the moment catering to many of the big factories. For the last couple of years, these small-scale manufacturers have been facing serious difficulties in their production which in turn have posed problems for the Purchasing Departments of the big factories. Practically none of the suppliers are able to keep the delivery schedule. The situation is aggravated by the inadequate availability of raw materials as well as financial scarcity.

Payment. Most of the small-scale suppliers are generally agreeable to the supply of materials with 30 days' credit facility. In some companies payment period is extended to 90 days. Whatever might be the terms of payment it has generally been observed that suppliers are not paid in time. This makes the position of the Purchasing Department awkward. They procure materials on a clear understanding that payment will be made within the stipulated period and failure on this count causes them loss of face. Since supplies have to come from the same parties, the Purchase Officer finds himself in a very tight corner if the earlier payments are still due. Whatever might be the internal bottlenecks, they should be expeditiously solved and payments should not be allowed to suffer. It has been observed that timely help (both financial and technical) to small-scale third party suppliers can generate purposeful output.

Staffing. Complicated formalities in the procurement of raw materials through Government agencies have multiplied the work but the staff strength has not increased proportionately. This, in turn, is affecting not only the procurement programme but also the market analysis function. In the absence of reliable market analysis function, one is not sure whether one is procuring the right materials at the right price. Since the department which manages materials plays a vital role in the industries, it is absolutely necessary that it is properly staffed. 'Austerity measures' applied to this department lead to loss and not to economy.

Stock policy. The situation as outlined above is likely to continue for a few more years. And to cope with it, the materials management units would need top management's full support in the reorganisation of the long range and short range planning, so that sufficient lead time could be given for the procurement of materials. The lower stock policies should be changed to "safer" stock policy. And finally, the purchasing units should be properly staffed so that they are in a position to conduct a thorough market survey and scrutiny and at the same time chase the suppliers. In the present situation, 'chasing' on telephone is not at all effective.

It has been observed that 'personal pursuance' brings more fruitful results than a mere tinkle. "Sit on neck and get the thing done" is the best way nowadays.

The points mentioned above may not be new. It is also not necessary that every one is facing these problems. But the existence of these problems in some form cannot be denied.

As the industrial activities are growing, complexities are also increasing. The general decline in the efficiency of an organisation as it grows is generally imputed to a failure on the part of the management. Managers responsible for making the best use of their resources have today a great challenge. Hence until and unless the 'responsible' persons of the organisations (where they are serving) devote their energies to considering other possibilities for improving the performance of their organisations and overcoming the effects of the world events in their operations, they will only be doing harm to the organisations they are serving.

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ORGANISATION FOR MATERIALS MANAGEMENT*

An industry is a system in which materials are consumed and at the same time materials are generated. The objective of any industry is to maximise productivity and earn reasonable profit. This requires that the consumable materials are utilised in a planned and systematic way for better results. In order to achieve this, one has to analyse the relationships among the correct and incorrect processes and formulate principles—better economic principles with the minimum disruption in operations. Since materials play the most vital role in industry, since the very time of industrial revolution much importance has been given to the management of materials. Wherever there are incorrect processes in operation, efforts are made to correct them. Industrialists of today, more particularly of tomorrow, will have to see that their 'materials' are properly managed so as to achieve the maximum gain. Much of the industry's efficiency is disrupted due to the inefficiency in the systems of materials management. Many papers have been written on the operational side of this discipline, but little attempt has been made so far to analyse its organisational structure which has got direct bearing on the operational efficiency of the organisation. This chapter seeks to analyse the integrated organisational structure of the Materials Management Department now in vogue in different industries all over the world.

History of Organisational Set-up

The organisational set-up itself has a long history. In ancient India, kings used to rule their kingdoms through divisions and sub-divisions and each division or sub-division was headed by an Administrator, under whom again there were a number of people assigned different types of work. This was necessary for the systematic running of the administration. Similarly, in the military

* Adapted from the author's article entitled "Set-up for Materials Management", published in *Business Standard*, Calcutta, 8th January 1977.

also, there were divisions and sub-divisions, and much of the success of a military operation depended on the organisational set-up. With the passage of time these systems and set-ups are being refined and perfected to suit the individual needs and requirements.

After the great industrial revolution, Great Britain was the first country that tried to induct the organised organisational set-up in the industry in order to face the growing needs of the industry. "To the pragmatic men who controlled much of Britain's industry, personal and detailed supervision of all facets of the business was an essential requirement. The whole power of making decisions commonly rested in the hands of the proprietor or his paid manager. To do this effectively, he might deal directly with a large number of subordinates. For example, Thomas Brassey, the Victorian Railway Contractor, dealt with up to 400 sub-contractors personally. It was only towards the end of the century that the need to depart from this situation and assign responsibility to lower rank officials became widely recognised."

After this recognition, many people worked on the subject with the idea of rationalising the system. One of the first attempts at such rationalisation is contained in *The Commercial Organisation of the Factory*, by J. Slater Lewis, which was published in 1896. This book is recognised as one of the earliest management textbooks. Lewis is perhaps the first man to present Staff Organisation Diagram in his book.² After him, with the development of technology and complications in economy, many people carried out intensive research work on the organisational pattern along with the management practice. At this stage, it is rather difficult to identify which one is the best, as most of the publications are extremely need based. But this was necessary because of specialisation required in different disciplines. Now there are many disciplines which need particular attention due to the complexities in subjects and objects. Individual discipline calls for individual analysis—and materials management is one of such disciplines.

Definition and Areas

In their report, the study team on public sector undertakings defined materials management: "Materials Management, as the name suggests, covers the efficient management of materials in all its aspects affecting the flow, conservation and utilisation, and the quality and cost of materials. The range of function includes:

- (i) materials planning and programming ;
- (ii) purchasing and inventory control ;
- (iii) receiving, warehousing and store-keeping ;

- (iv) transportation and materials handling ; and
- (v) disposal of scrap and surplus including the utilisation of by-products.”³

This integrated approach has become necessary for the economical working and development of industries for judicious and economical use of available materials. While discussing materials management in their book *Purchasing Management*, Professors Westing, Fine and Zenz wrote: “Material Management is, therefore, an organisational concept that localises or brings together under one organisational component the responsibility for (1) determining the manufacturing requirements, (2) scheduling the manufacturing process, and (3) procuring, storing and dispersing materials within allowable cost. . . . The functional areas involved in materials management usually include purchasing, production control, inventory control, traffic, stores, scheduling, receiving and warehousing.”⁴

Incoming Inspection

In my opinion, to attain the objective in a more significant way, the area of the materials management has to be enlarged with incoming inspection under it. Incoming inspection is directly linked up with incoming materials. It is the ultimate responsibility of Materials Management Department to feed the manufacturing units with quality materials at the right time and at the right price. The reasons for having incoming inspection under materials management are as follows :

(1) Since both the Incoming Inspection Department and Production Planning and Control Department are directly involved in the “acceptance” and “issue” of materials as per planning, it is necessary that these two departments are tagged to materials management. This will help the materials manager to co-ordinate the work efficiently, which will ultimately help to get the right material at the right time, to reduce scrap, to control stock as per the production planning and, lastly, to help him solve many an unnecessary “fuss” over the incoming materials.

(2) Since the inspectors are fully conversant with the acceptance standards of the materials, it is very helpful to get the assistance of the inspectors in solving the problems of the vendors. They can guide the vendors, they can make them understand the actual requirement and also suggest remedial measures. Until and unless this department comes under materials management, it is not possible for the materials manager to give effective technical assistance to vendors.

(3) The materials manager will be in a better position to deal with "ESCAPES" (in industrial terminology 'Escapes' means failure of the inspector to identify defective material), otherwise these materials will continue to remain nobody's business.

Inspectors will also be in a position to get quick decisions keeping in view the stock position and availability.

(4) It has been observed that for want of co-ordination and because of in-plant politics, the intimation on the rejected materials/consignments is not passed on quickly to the vendor, which definitely is very harmful, as the vendor cannot take immediate corrective steps. Besides, sometimes materials are held up due to the non-availability of decisions. In many plants, I have seen inspectors running about for decisions from one corner to another. If inspection is under materials manager, it will be easier for the materials manager to give quick decision as he will be able to know the stock position, delivery schedule and unit requirements.

(5) "Where it is necessary to utilise an outside testing agency or commercial laboratory, because inspection requirements are complicated or expensive, the responsibility for inspection is almost invariably placed on the Purchasing Department or, when it is necessary that a shipment be inspected before it is shipped by the supplier, the inspection responsibility is similarly placed on the Purchasing Department. Such inspection, known as field inspection, takes place at the supplier's plant. The reason for the assignment of field inspection to the Purchasing Department is the desire to keep all contacts with suppliers within a single department, since it has been found that this contributes to good supplier relations."

All these considerations have led me to believe that for system effectiveness, it is essential that incoming inspection is tagged up with the materials management function. One thing one will have to keep in mind is that with increasing complexity in the field of industrial activity, the major problems related to system effectiveness have increased correspondingly. One who will be able to solve the problems efficiently will definitely have an edge over others. The materials manager of today, and more particularly of the future, will have to play a major role in industry, and his techno-economic skill will become more and more important. All these call for decision-making to choose between the various possibilities and the application of techniques thereof. Now, it is up to the Management of today how they decide to orient their material management function.

Organisational Structures

The organisational structures of the material management department vary from organisation to organisation so as to suit their individual requirements, but to have functions related to materials under one head is almost universal. The head is generally called the materials manager, who ordinarily reports to the Factory Manager where material management is used at the factory level. The system in the organisations, which have corporate materials managers, is either to report to the Technical Director or the Managing Director. Frankly speaking, there cannot be any definite ideal system of reporting because of diverse pattern of activities.

Fig. 1 illustrates corporate level materials management reporting to Technical Director. This is particularly applicable to large organisations where there are a number of manufacturing units in different geographical locations. In such cases the chief materials manager is assisted by materials managers responsible for each unit; and the materials managers generally have double reporting system—to unit head, *i.e.*, factory manager for administrative activities, and to chief materials manager for functional activities.

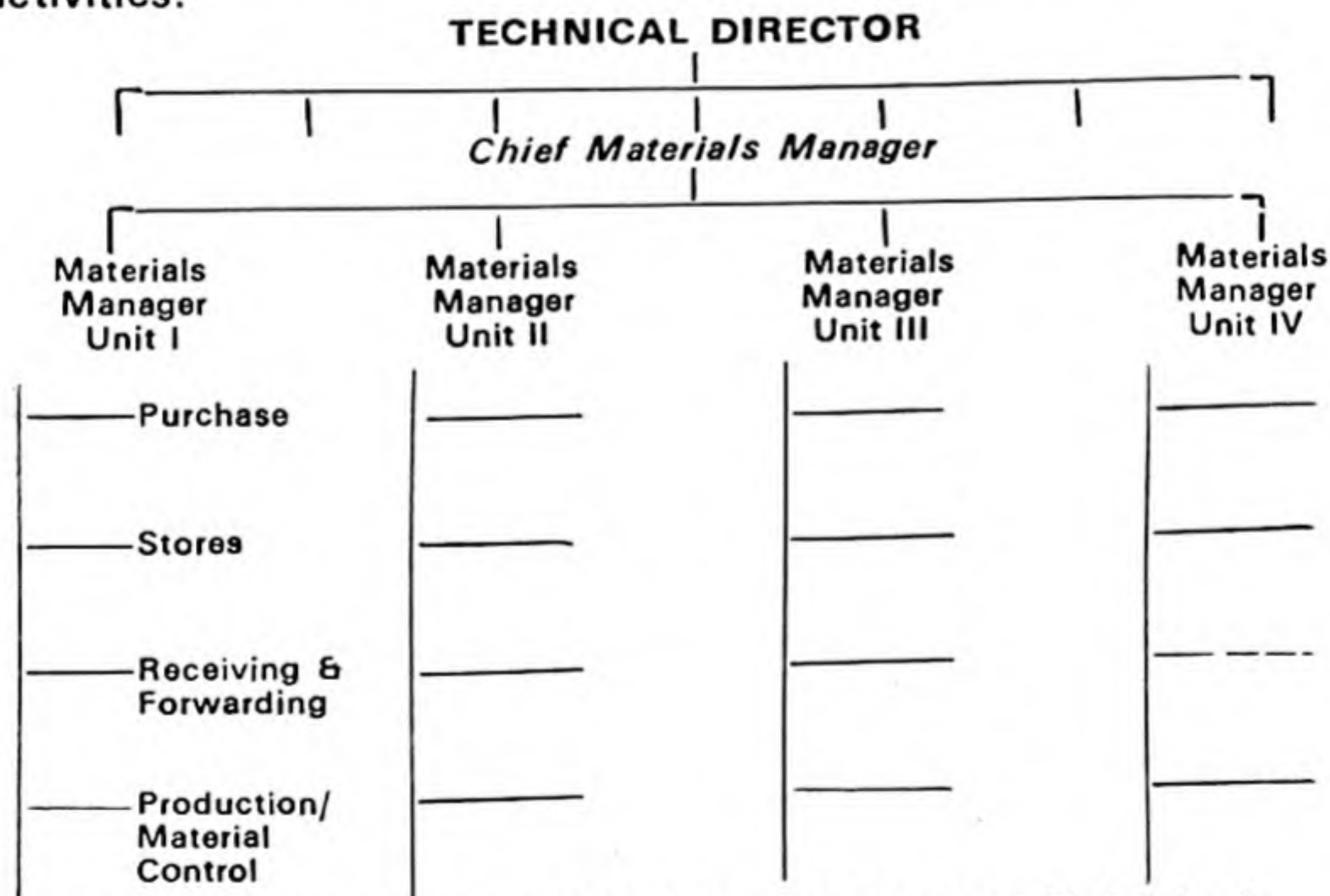


Fig. 1—Corporate Level Material Management Multiplant Units in Different Geographical Locations.

Fig. 2 illustrates the reporting level to the general manager. This organisation structure is more applicable to single large units where purchasing and related materials functions are concerned with the needs of only one or two plants.

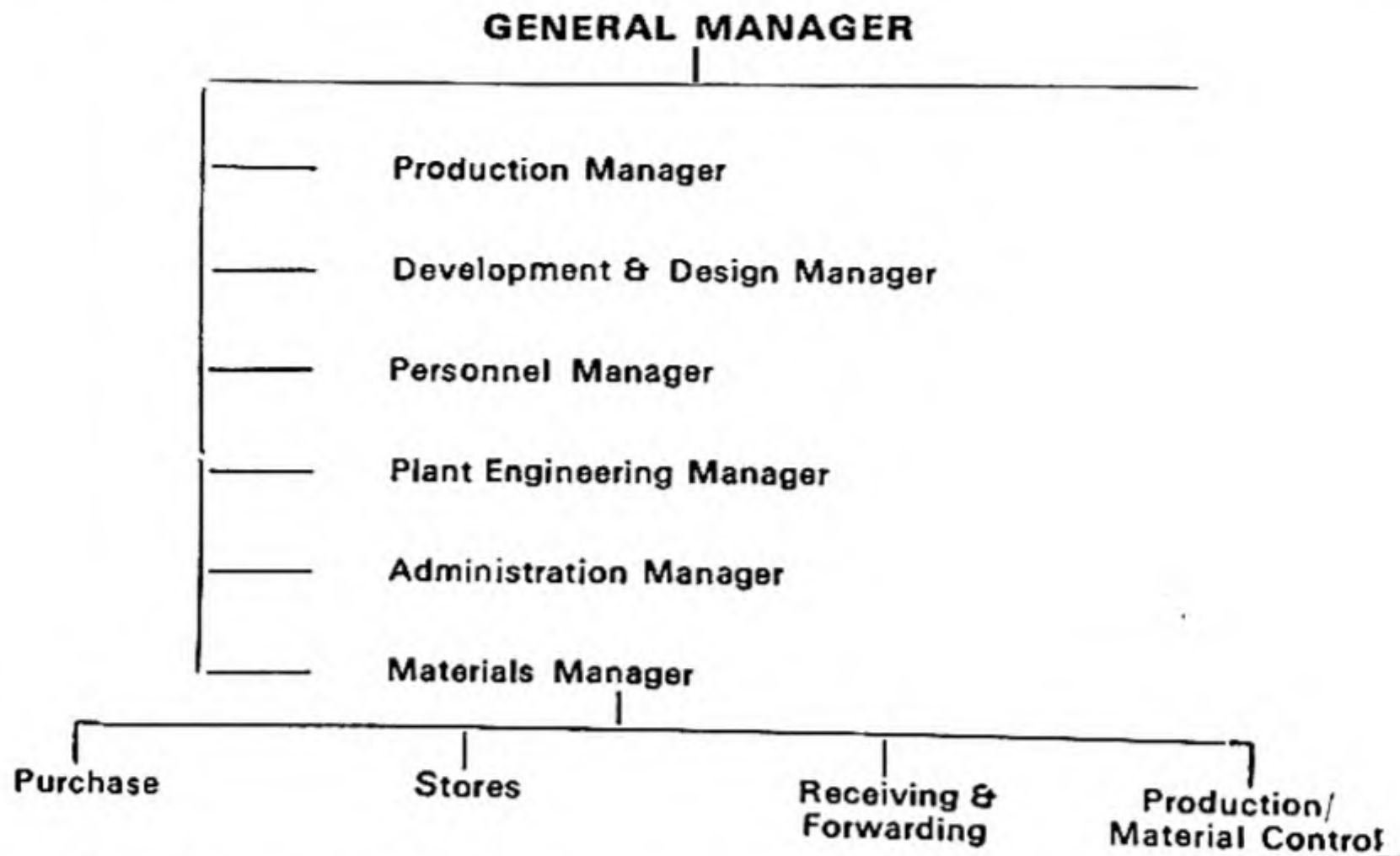


Fig. 2—Materials Management—Large Single Unit.

Fig. 3 illustrates where materials management is practised at factory level only. This is applicable to medium and small-scale units.

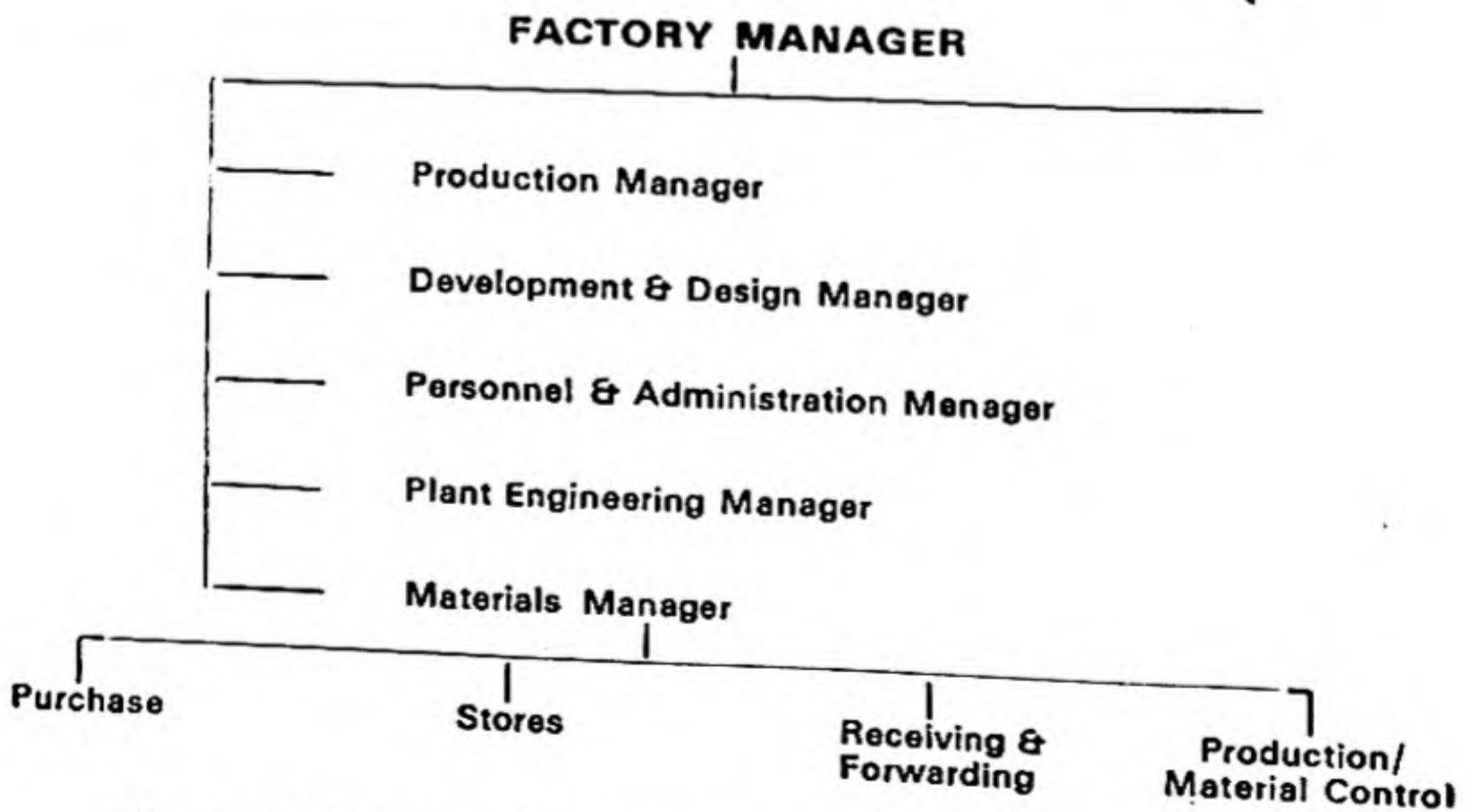


Fig. 3—Materials Management—Medium and Small Units.

Since materials management is playing a vital role in boosting industrial efficiency, it is essential that the materials manager gets sufficient power to get the things done without much procedural bottlenecks. That is why most of the organisations are vesting sufficient power in their materials manager. In their report, the study team of public sector undertakings pointed out: "Even though separately organised, materials management is directly concerned with most areas of management, *viz.*, production, maintenance and sales, and even accounts. We suggest that in the management structure, the materials management function should be placed at a sufficiently high level to enable the effective exercise of checks and balances cutting across different management branches."⁶

In India, at the moment, some of the organisations have materials management function with Purchasing, Stores and Receiving and Forwarding activities and some units have all that is mentioned in the organisation charts. As this depends on individual requirement, individual organisations have to evaluate their controlling tools so as to come to a rational organisational structure, which will be in a position to handle the problems related to materials and come out with a meaningful solution.

The fundamental reason for combining all the departments related with materials under a materials manager is to provide improved coordination and control for higher efficiency. But the desired efficiency cannot be achieved if the organisational structure of the whole department is not set up in a rational way based on overall company objectives.

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MANAGEMENT OF MATERIALS IN ADVERSE CONDITIONS*

The years 1974 and 1975 have been difficult years in many respects. The worsening of the general economic situation in the world, which manifested itself in continuous inflation and cost increases and fewer sales opportunities not only caused a disequilibrium in industrial economics but also caused considerable decrease in many companies' net results. There is even now little reason for greater optimism about the near future, though there are indications of somewhat recovery from economic stagnation. Under such adverse conditions, one has to work hard, and harder still to overcome the difficulties. Everyone has to see how he can give his best in his own sphere. This crisis in the industrial world is a cyclic phenomenon and everyone has to fight the adverse conditions which try to strike at the very roots of an economy. Everyone must take pains to understand and all must be willing to make their position and agreement understood. Although this need has been recognised nationally, a greater understanding at all levels is essential.

Men, who are managing materials in industry, have much to offer in this line. This calls for a scrutiny of the philosophy of materials management.

Materials are an important determinant of the total cost of production as they take up something like 20 to 30 per cent of the total cost, in some cases even 60 per cent. It is, therefore, obvious that materials require serious attention in any work of production. Materials include not only raw materials, components and sub-assemblies, but also finished products. They are classified into two groups : (1) Direct, and (2) Indirect.

Direct materials go direct into the product and form a part of the end-product, while indirect materials are utilised in processing

*Adapted from the author's article entitled 'Materials Management—Strategy to Face Adverse Conditions', published in *The Economic Times*, New Delhi/ Bombay, 29th April 1976 and 30th April 1976.

or refining or packing the direct materials/end-product. Hence, materials management is involved in a number of things like the determination of quantity and quality ; purchasing, storing, issuing and despatching.

As the complexities are increasing, management scientists are exploring the possibilities of more and more activity integration for a unified disposal of techniques for better administration. Previously, purchasing, store-keeping, despatching and planning control were separate functions, but now these are treated as one function, which is known as materials management. The basic philosophy of materials management, which is now generally accepted, is that it is a specialised and scientific function of a group of people for better procurement/storage and distribution of materials. Such functions formerly were the exclusive and unfettered prerogative of individual managers.

IMPACT OF ADVERSE CONDITIONS

1. On Purchasing (Fig.1)

The increased volume of social control, the extension of tighter control on money and the increased inflatory effects on the system have made the overall situation really grave. On top of it, technological developments are moving fast and will continue till the widening gap between rising costs and productivity comes to a point of equilibrium. This high speed of development in many fields is increasing the risk of managerial obsolescence. It is, therefore, necessary to devote sufficient time and resources to keep the skills and knowledge of the present generation of purchasing managers up-to-date. The success of any purchase department under adverse conditions will depend, to a large extent, on the ability of the purchasing executives to bring together various qualities of individuals on functional groups which will contribute to success (if they are used in the right way).

This may necessitate various changes in the operations and structure of the department—but if such changes are necessary, we shall have to do them at the right moment. Further delay will only bring further problems. But in this respect the manager himself should be willing to accept the change, otherwise nothing will really materialise. Russell M. Currie writes : “Management is the art and science of getting things done through people. Most people resist change. But management is dedicated to change, since it is necessary for growth and progress. So, the crux of the

manager's job is getting the people through whom he accomplishes his objectives to understand and accept the changes he

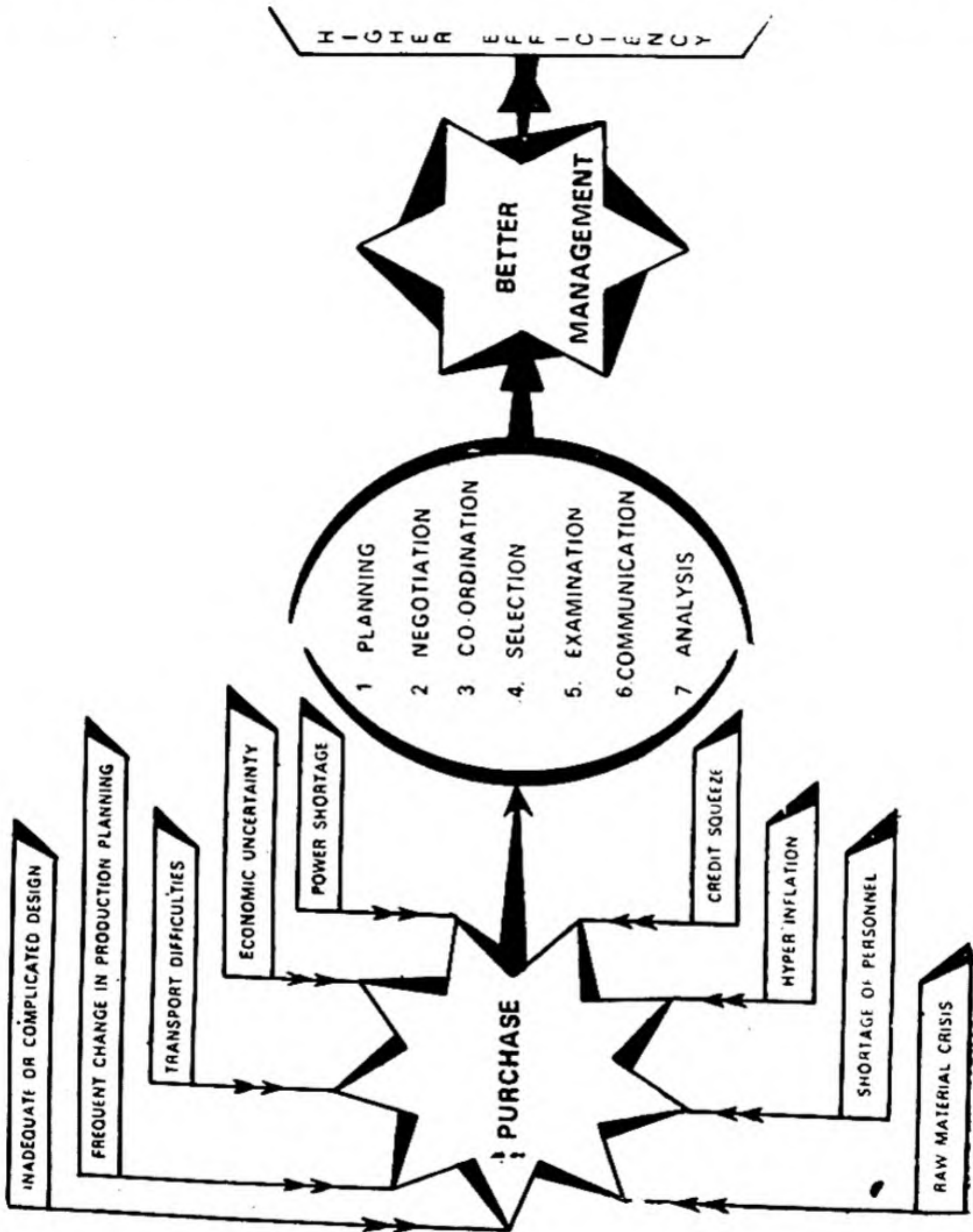


Fig. 1.

knows are needed. How can he do so unless he shows he is willing to accept change at his own level ?”

In recent years the scarcity of raw materials has practically put the people in purchasing department in a very tight position.

Coupled with it the financial constraint has made the position worse. The available resources have been consistently proving insufficient for realising the targets set forth in planning. One point, which I would like to stress emphatically, is that the difficulty faced by the purchasing department can be slightly eased out if the designers take a little pain to consult the purchasing personnel about the continuous availability of raw materials and about the technological capabilities of the vendors, especially the vendors with limited resources. I cite below an example in which it can be seen how a purchase officer solved his problem with the direct help of the design department. Once a BNC connector was required for a sophisticated electronic equipment. Earlier this particular item used to be imported. As per MIL specifications, the contacts of the connectors are to be made of beryllium copper which gives the best balance between good electrical conductivity and superior spring quality necessary to assure good electrical connection between all the contacts in the plugs and their sockets. The purchase officer had been able to locate a party who was in a position to fabricate the item but his main difficulty was to make contacts out of beryllium copper, as beryllium copper rod was not readily available in India. This matter was brought to the notice of the design department, and the purchase officer made a suggestion that the contacts be made of phosphorbronze rods. The suggestion was considered by the design department. After giving extensive trials to the contacts made from phosphorbronze rods, the design department gave their approval to fabricate the connectors with phosphorbronze contacts. Though by phosphorbronze a very high degree of reliability cannot be achieved, yet in this particular instance, as it withstood all the desirable tests required for the equipment, the design department was satisfied and the purchase officer could procure the material in time within the cost structure. Hence, in our condition, it will be the responsibility of the design department, wherever possible, to strike a balance between the availability and non-availability, if they really want to get things moving.

Quite often one might have observed that drawings come to the purchase department for components with high degree of close tolerances. If that high degree is really desirable, one will undoubtedly have to see what best can be done for the procurement of the component with that high degree of tolerances. But first of all one will have to see whether that high degree of tolerances is really necessary. Close tolerances not only make procurement difficult but also contributes much to high costs.

And if the component is procured at a high price or a slightly high price, 'questioning' comes from all the possible sectors. Regarding tolerances, W.W. Wilson, Deputy Chief, Engineering Division, National Aeronautics and Space Administration, in a letter to the author wrote, "In general, our designers and draftsmen have instructions to *not* specify on our engineering drawings tolerances that are more precise than the part in question actually must have for satisfactory performance and component interchangeability. The basic reason is obviously to minimise cost."

Under stringent monetary conditions, the purchase departments have to place orders for smaller lots of materials. The cost per unit of materials is related to the size of delivery or order quantity. Larger lot deliveries command a price discount and smaller lot deliveries sometimes call for extra premiums, and on top of it there are probabilities of stockouts. The price of stockouts is not easy to express in money value. Because of inadequate stocks, if a customer's order is refused or unduly delayed, it may lead to the loss of some or all of any future business with the customer. In a situation where the sellers are trying to push as much as they can, and the purchasers are trying to buy as little as possible, the buying position really becomes precarious. When we have to deal with such a situation, we shall have to see how to do better with the available resources. We shall have to see that available resources are utilised in a most systematic and unified way for a better result.

For this, purchasing people have to analyse the existing buying policy and tune it with the company's overall policy. They are the main 'outlet' of company's cash, hence greater responsibilities lie with them. They have to see that the 'cash' is deployed efficiently and effectively for the benefit of the company which they are serving. Among many other possibilities, the following few methods will perhaps be helpful in easing out the situation :

(i) Ordering for several months' requirement of an item, but to be delivered as required in smaller lots subject to a minimum notice period. This will also help to get the advantage of price reduction on the full amount of the order.

(ii) Tying up several items together and place order on one supplier (subject to price and quality). A price advantage may be obtained on smaller deliveries which are being compensated by other orders.

(iii) Minimising the costs associated with ordering through improved method and time study.

(iv) Discussing thoroughly the possibilities of stockouts with the production planning department/production department and finally with the management before taking a risk of stockout. For this the following questions are to be answered first :

- (a) What is the probability of stockout ?
- (b) What will be the average duration of stockout ?
- (c) Can emergency action (by paying a premium for an emergency delivery) help to solve the problem ?
- (d) Can an examination of consequences be made, to set a value by using simple statistical methods related to production stoppage, non-delivery of materials, customers' goodwill, etc. ?

(v) Last but the most important one is that the right man should be put at the right job. As the efficiency and effectiveness of the department is directly dependent on the personal qualities of the persons working (specially in a department like purchase, where efficiency, drive and initiative play a vital role), it is highly essential that the department is properly staffed so that even the junior assistants are in a position to visualise the situation (one should not forget that these persons are the 'outlet' of company's cash). G. Salvendy of Purdue University, Indiana, U.S.A., writes in his article *Psychomotor Skills and Occupational Productivity*: "The human factors discipline consists basically of two components. One deals with fitting the job to the man while the other consists of fitting the man to the job. . . . Fitting the man to the job is concerned with personnel selection and training."² Hence it is clear that the selection and training of personnel for development and disposal of buying activities play a vital role in materials management under adverse conditions.

There are innumerable adverse conditions in the present-day purchasing activities. No doubt everybody is trying to overcome these problems but one thing we shall have to keep in mind is that the functional place of the enterprise is a dynamic one, and the circumstances both on the purchase and the sales market are changing continuously. Consequently we must be able to adjust our performance continuously to the changed circumstances to achieve a new optimum under the new conditions. Further, the purchasing executives of today should keep them abreast of developments in national and international markets to ensure that they remain equipped to meet the changing conditions.

2. On Inventories (Fig. 2)

Just as a housewife is now finding tough time to manage her household stock (as she is unable to keep her store well stocked), similarly a stores officer in an industry is facing rough weather to keep his inventory level smooth to facilitate steady and efficient plant operation and enable his enterprise to meet the orders promptly. Holding of stock costs money. Huge amount of money is likely to be tied up with stock on which there is no direct return. Too high a stock which indirectly ties up money reflects badly on operation cost and too low stock may also cause loss in business; and on top of all, money has become really scarce. So we shall have to find out a healthy means to solve this problem, which may be extremely difficult. Some factors such as costs are relatively stable, some, such as monthly sales, are subject to fluctuations; while others are intangible and to some extent a matter of judgment.

In an industry we generally have the following principal categories of stock :

- (a) Raw materials and components,
- (b) Work in progress,
- (c) Goods in transit,
- (d) Unfinished stocks at sometime intermediate stage or stages of a process,
- (e) Tools,
- (f) Spares for plant and machinery,
- (g) Finished products awaiting delivery to sales department/ awaiting sales or awaiting despatch to customers.

To a certain extent, the problems arising in holding the stock are the same as or analogous to those arising in production. But maintaining the stock as per the budgeted level in our circumstances is a unique problem. Many approaches to the stock control problem, ranging from unsophisticated manual system to sophisticated computer system, have been proposed but it seems that nothing has yet been proved a successful one. Harold Whitehead in his book *How to Become a Successful Manager* writes: "Problems created by new circumstances have to be solved, difficulties overcome, personal relations developed, experiments undertaken, temper controlled (not always easy!), hard and imaginative thinking done, and persistent and consistent effort made. It

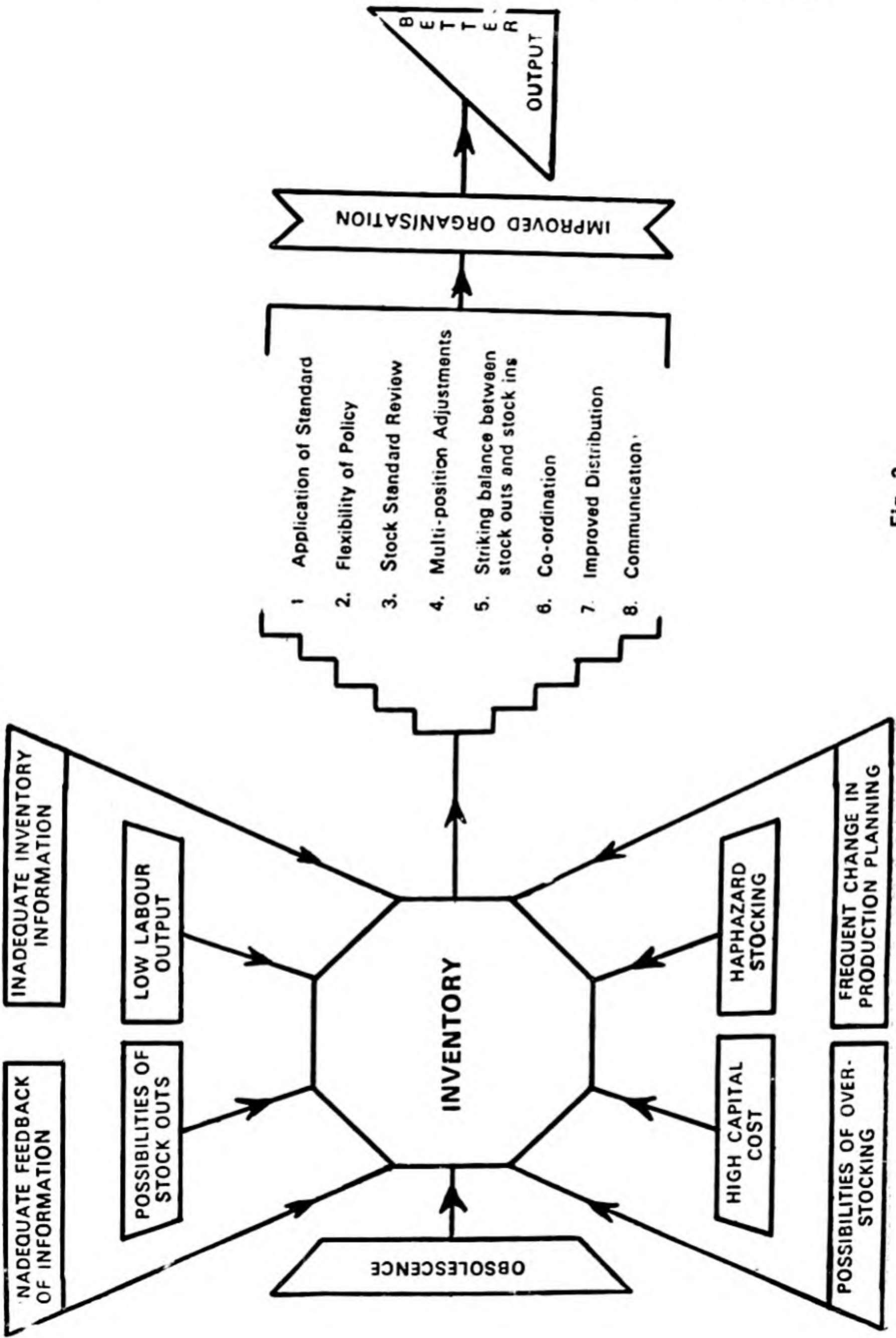


Fig. 2.

is not enough merely to climb over these obstacles; the climbing has to be better and quicker than 'good enough'.³

The following are a few problems most of the industries are nowadays facing in maintaining the budgeted stock level :

(a) Due to uncertainty in market conditions, 'complicated' and 'one-party supply' items are sometimes taken into stock in larger quantities than the standard stock policy.

(b) Series being small, sometimes one has to take the entire requirement in one go—specially the imported components.

(c) Uncertainty in getting the import licences which have got a direct bearing on production and inventory level.

(d) Erratic and unscheduled delivery of materials by the suppliers.

(e) Sometimes the requirement being rather small, it becomes difficult to procure exactly as per the requirement and to solve this situation, the minimum quantity offered (which may be too much for the purchaser) by the seller is purchased.

(f) Sudden and unwarranted increase in selling price by the large-scale/medium-scale manufacturer.

(g) Excess of the wrong materials in the wrong places.

Each one of these problems needs solution on merit basis; and the formulation of solutions varies from industry to industry. Whatever may be the case, these problems are to be solved in a better way and must be 'better than good enough'.

Regarding maintaining the budgeted level of inventory (though difficult to maintain) one must periodically review the inventory level and compare it with the budgeted level and take action to effect any improvements possible. For this it will be better to have 'inventory review board' consisting of following persons :

- (i) Materials Manager,
- (ii) Finance Manager,
- (iii) Production Manager, and
- (iv) Work Study Manager.

Of course, now, with the advancement of technology and with the increase of complexities, larger organisations are taking

the help of computers for the problems related to stock control and material flow which once appeared intractable because of their complexity. But how far these computers have been successful in stock saving is yet to be seen. Regarding the computerised stock control, A.J.H. Morrell, Editor of *Problems of Stocks and Storage* writes : "...with the increasing use of computers, problems which once appeared intractable because of their complexity are becoming much more readily soluble, but there are examples in industrial and commercial enterprises, in this and other countries, of computer-based stock control methods which are more expensive than the value of stock saved. If a costly method is going to be used, e.g., requiring a lot of computer time to be bought or an elaborate system to maintain a stock control procedure, then clearly the cost of that method must be included in the economics of the problem."⁴

A.C. Jones, Group Works Management Executive, Electronics Division, Plassey Company Ltd., U.K. in his article *Mechanisation of Stock Control in Small Batch or Jobbing Manufacture* points out : "The radical change from a manual system to complete computerisation of stock control brings new problems, frustration and even failures. He further points out (specially in small batch production or jobbing manufacture) certain severe drawbacks in full computerisation of stock control: these would be (a) loss of visible stock records, (b) high change rate in small batch production, (c) high cost of transaction checking, (d) multiuse documents, etc. To solve these problems the first stage solution as described in his article includes (a) the use of electronic accounting machine with its own data storage, programming ability and punch tape output, combined with (b) a sampling analysis of the work of material provisioners and stock control clerks."⁵

While I have touched upon certain problems of materials management and I hope to have been able to pinpoint them, it is not my purpose to develop in detail the policies of materials management and their application. Nor am I concerned with the functional aspects of management. All I hope to have done is to give a picture in broad outline of the impact of adverse conditions on materials management. I conclude this chapter with the strong belief that a materials manager, by full exercise of his responsibilities and opportunities, can give greater service to the company he is serving. And the responsibilities, which are being shouldered by the materials managers are gigantic and challenging indeed.

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4

AVAILABILITY RESEARCH ON MATERIALS*

The application of a technique is often looked upon as a stop-gap measure—to put things right when anything has gone wrong. But its true value is to be seen in its application as a continuous process, as a part of basic management philosophy. Whether an economic unit is a private company or a government undertaking, the basic attitude is the most important. However much we may improve the techniques we use and the standard of those that apply them, in the long run, their effectiveness is going to rest very largely on the attitude to their application. It is better not to attempt anything with a half-hearted attitude—as a half-hearted attitude to application is intrinsically harmful to the whole system. With the increasing complexities in the procurement of industrial raw materials and components, many techniques and methods have been evolved to face the ever-increasing problems methodically with the ultimate object of increasing the system effectiveness. It is up to the management of today how they apply these techniques with reference to the availability of their own resources. But one thing is certain—without the application of scientific methods no one will be in a position to get the best result. Some organisations, by virtue of their solid financial stability, may sometimes succeed, but not always. Sometimes, somewhere, they too will be caught on the wrong foot.

Practically all over the world, large companies are spending huge amounts towards research on purchasing management—as they have rightly visualised that without efficient buying they will not be able to produce quality products at a minimum cost and compete in the national and international markets.

Research on availability so far has not drawn much attention in our country, though it is one of the most important factors in modern industry due to factors like the general shortage of raw

* Adapted from the author's article entitled "Materials Management—Availability Research" published in the *Economic Times*, Calcutta/Bombay/New Delhi, 1st May 1977.

materials. Hence this chapter is going to analyse the activities needed for organising a system like 'availability research'. The activities are described below :

<i>Activities</i>	<i>Effectiveness</i>	<i>Result</i>	<i>Objective</i>
1. Organisation	Integration	Efficiency	Quality Products with Minimum Cost
2. Development of information	Knowledge	Application	
3. Evaluation of Source of Supply	Ease and Speed	Economy	
4. Data Collection and Feeding	Information	Service	

1. Organisation

Availability research provides information on the availability of raw materials and components in national and international markets at a right price and a myriad of allied information. Effective purchasing management is almost impossible without the assistance of availability research. Important uses of availability research can be summarised under the following heads :

- (a) it ascertains the standing of a company in a specific industry ;
- (b) it indicates the present and future trends of the availability of materials ;
- (c) it indicates the sources of supply, prices, quality ;
- (d) it aids the development and introduction of new products ;
- (e) it shows ways of improving and innovating the present purchasing system ; and
- (f) it results in appraising and increasing the effectiveness of purchasing management.

All these cannot be done in an unorganised way—hence it is necessary to organise the activities in such a way that it works efficiently. Since organisation has got direct bearing on efficiency, it is absolutely essential that a few relevant comments are made in this regard.

Availability research should be the direct responsibility of a person who is either reporting to purchase manager or to materials

manager, depending on the whole organisational structure of the unit. For a multi-unit large organisation, the ideal organisational structure would be as depicted in Fig. 1. The man, who will

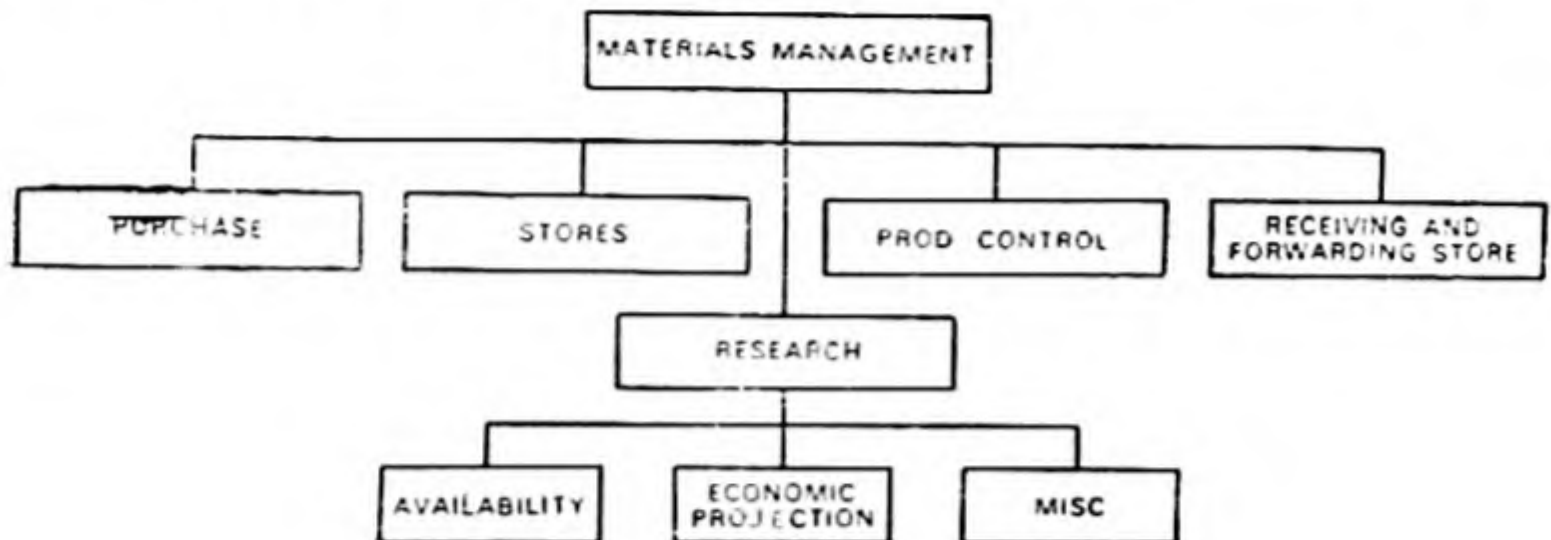


Fig. 1.

directly head such activity, should have some, if not all, of the following attributes:

- (a) He must know his company and its products fully well (both technical aspects and economic aspects).
- (b) He must have a logical and analytical mind.
- (c) He must have a questioning attitude.
- (d) He must have knowledge of market trends (national and international).
- (e) He must be able to locate the areas which can be further improved/developed.
- (f) He must be creative.
- (g) He must be willing to expose himself to criticism.
- (h) He must know the techniques related to vendor development/evaluation.
- (i) He must be in a position to increase the level of trust and support among organisational members.
- (j) He must be able to find synergistic solutions to problems with greater frequency.
- (k) He must be able to create an environment in which the authority of the assigned role is augmented by the authority based on knowledge and skill.
- (l) He must be able to increase openness in communication, both vertically and horizontally.

Such a man, if he can be found (though rare) will be an asset to the organisation.

If the activities are to be run in a systematic way with an eye on results, a certain amount of autonomy has to be given to the persons responsible for carrying out research work. It has been observed that much research work gets stuck up due to interference from the immediate superior or some other corners not directly linked up with the activities. This negative side has to be guarded against. The persons assisting a research worker should also be energetic and knowledgeable who would be in a position to update constantly the related information and data.

Although cost criteria will influence the formation of such an organisation, the consensus is that the research activity of above nature can be carried out best by a set-up which does not shoulder the responsibility of buying. Now it is up to the individual management how they orient their availability research—depending on their own requirement and financial resources. But I would like to stress that those who are not sure about the system, should not venture for this.

2. Development of Information

Before considering any activity, we should remember that information is necessary on why and how this is to be implemented. As I see in the present context, there are three separate but interrelated stages for information regarding source of information, processing of information and interpretation of information. In another way, this can be described as below :

- I. Information—Collection
- II. Information—Processing
- III. Information—Interpretation

Collection of information involves a thorough analysis of products and materials being used in the organisation and the substitute, if possible, in case of need. It has been observed that a number of industries keep themselves content with the availability of materials as per the immediate requirements, but now the market condition is such that they have to keep themselves armed with all types of information regarding the availability of substitute materials in near future or at a very short notice. For this researchers shall have to

- (i) keep themselves abreast of the latest product information, service facilities, prices. This factor is dependent on the long-range planning and products of the company to which the researchers belong ;

- (ii) use their judgment to gather information about the products and materials which their own organisation will be requiring even after five years ; and
- (iii) know the related production programme of their suppliers during the next five years.

After information has been gathered, it has to be processed into forms that have higher utility and value to the purchasing people and particularly to the designers. A broader meaning of this processing makes it a research activity that goes beyond the simple act of information collection. This includes planning of policy activities covering a wide range of related and complementary activities. To be more precise, on the basis of the processed information, the management will be in a position to decide the purchase policy, the designers will be able to plan their design work related to the product and purchasing department will be in a position to know from where these could be procured ensuring right price, right quality and right quantity without losing much time. This in turn will help the organisation to minimise or eliminate disruptions in production resulting from lack of any material, equipment or supplies. In general, purchase officers and assistants are extremely busy and they hardly get time to think of a 'better way' though they can do a lot. Time does not just permit them to analyse the long-range requirements in a systematic way. There is no use of speaking and propagating beautiful and lofty words on the role of the purchasing people if the basic approach of the system is not oriented in such a way that the system itself can give results which are meaningful to the organisation. Dozens of vendors could be available for one type of product. It is surely not possible for the regular purchasing staff to know all of them or even half of them. Here the research people can directly help the purchasing people by feeding the already processed information. What I have said may sound a bit peculiar to the people who are not related with the purchasing activities but this is nothing but whole truth.

After processing the information, it has to be properly interpreted in order to find out its true relevance. Let us suppose a particular company will be manufacturing X type of transistors in 1985 which will be required for the production in the researcher's organisation; price indication and quality indication of the company are to be given by the researchers along with the interpretation about the possibility of getting those transistors or whether those transistors will at all be marketed by that

company in 1985. This interpretation could be made from the past as well as present record of the company in question. If the research section feels that in their opinion it may not come up successfully then the designers should not venture to develop a product which requires that particular type of transistor. Rather they should go ahead with a thing which they are more or less sure to get. This type of information is definitely needed in today's complicated industrial situation.

Summarised idea of the development of information is projected in Fig. 2.

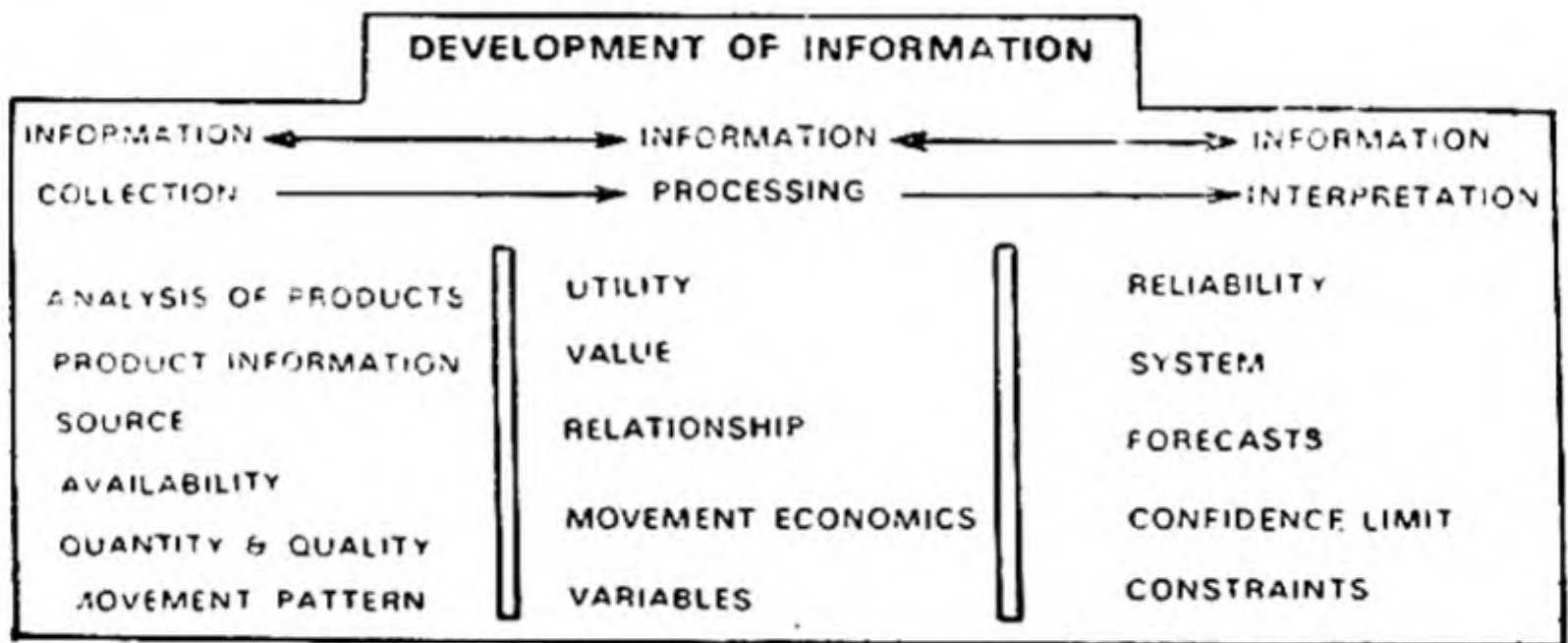


Fig. 2

3. Evaluation of the Source of Supply

The selection and evaluation of the source of supply is one of the most important factors of the purchasing management. This process not only influences a company's economic success but also the success of the supplier and the economic efficiency as a whole. Due to various factors prevailing in our industrial activity, it has not been possible to make any methodic approach in evaluating the source of supply. But persistently increasing complexities in the field of industrial production have made it essential to take care of this aspect. As has already been pointed out earlier, it is not possible for the regular purchasing staff to study and analyse the sources of supply, for they have little time to do this specialised job; so it should be the responsibility of the research group to carry out the process of evaluation. The reasons for assigning this job to the research group are as under:

- (i) This group specialises in analysis.
- (ii) Research is the only responsibility of this group—hence there will be no tendency to concentrate on other

functions. But if this work is assigned to purchasing group, there will often be a tendency to concentrate all efforts on the purchasing function, which is more urgent to them, thereby neglecting the research aspects.

- (iii) This group is in a position to develop corporate objective through strategic planning and integrate the corporate objective with purchasing objectives.
- (iv) This group has enough time to concentrate systematically on performance, appraisal and review.
- (v) It is in a better position to evaluate possible alternative proposals (any proposal is theoretical, in a sense, until it has been successfully practised), and so on.

Now for evaluating the source of supply, the people concerned have first of all to locate the names of the possible suppliers (for current and future) through (i) technical information relating to products and materials, (ii) economic data pertaining to supplying industries, (iii) vendor and commercial references to sources of supply and industry association, (iv) through directories, magazines, handbooks, periodicals, etc., and (v) through personal visits to various national and international information centres. After gathering information relevant to their industry, they shall have to evaluate the source of supply taking into consideration :

- (a) the financial position of the supplier;
- (b) economic and political developments and their effects on prices and availability (this is applicable to overseas suppliers) ;
- (c) facilities like plant and machineries, quality control system, storing and delivery system, tool room facility, flexibility in providing short lead time ;
- (d) performance statistics like the vendor's service record, confidential information from other sources regarding the vendor's performance ;
- (e) personnel information like the number of skilled people working, type of supervision, morale of workmen ;
- (f) quality report either from other sources or from the various samples of the prospective supplier.

It is strongly suggested that attempts should always be made to examine the conditions and possibilities—as only through such an examination can one be in a position to develop methods to be followed in evaluating the supplier. Further, the following

checklist may be useful as a summary of the points to be considered while developing proposals. These points are not in the procedural order (which will vary to suit the circumstances of individual organisations) and some of them may not be applicable to specific studies.

1. Is the short-range and long-range planning known?
2. What are the products?
3. Are the specifications available?
4. Who may be the possible suppliers?
(Write down complete names, detailing what is to be done, how, when, where, by whom.)
5. What are the costs and benefits?
6. Are the proposals feasible?
7. Are they practical?
8. What are the risk factors?
9. Has the matter been consulted with designers, users?
10. Have additional facts been checked/examined?
11. Have the despatch and receiving facilities been taken into consideration?
12. Have the delivery period, stockout, overstocking been taken into consideration?
13. Have factors like proximity to factories, population density, easy accessibility to motorways and railheads been checked?
14. What are the priorities?
15. Have the main difficulties that are to be overcome been analysed?

I have only included 15 items in the checklist—there may be many more which are directly dependent on the circumstances. It is undoubtedly the most important and critical task of the whole availability research to evaluate the source of supply in a judicious way. When the process is completed, it would be easier for the purchasing people to take the data straightaway and negotiate the price (if necessary) and procure the materials with minimum effort and maximum efficiency. I think that is what the management needs.

4. Data Collection and Data Feeding

When contemplating action, a rational step is to survey the existing requirements and the means by which they are currently being met and the additional requirements. Only when these and other relevant facts are available and the knowledge of all the

techniques involved is there can attempts be made to conceive and develop the optimum solution. Hence it is absolutely necessary that the data are collected in an efficient way and recorded on the record book or cards after processing and interpretation. The data are to be fed regularly to the people who are connected with purchasing activities and market trends, to the management and to the design and development department. The purpose of data feeding is to provide information for achieving greater reliability and improvements in the system. To obtain results, a feeding system must provide for the collection and reposting of information, and for analysing and presenting the data so that it can readily be understood and action taken on the information gained. The possible 'Data Feeding Loop' is shown in a diagrammatic form in Fig. 3.

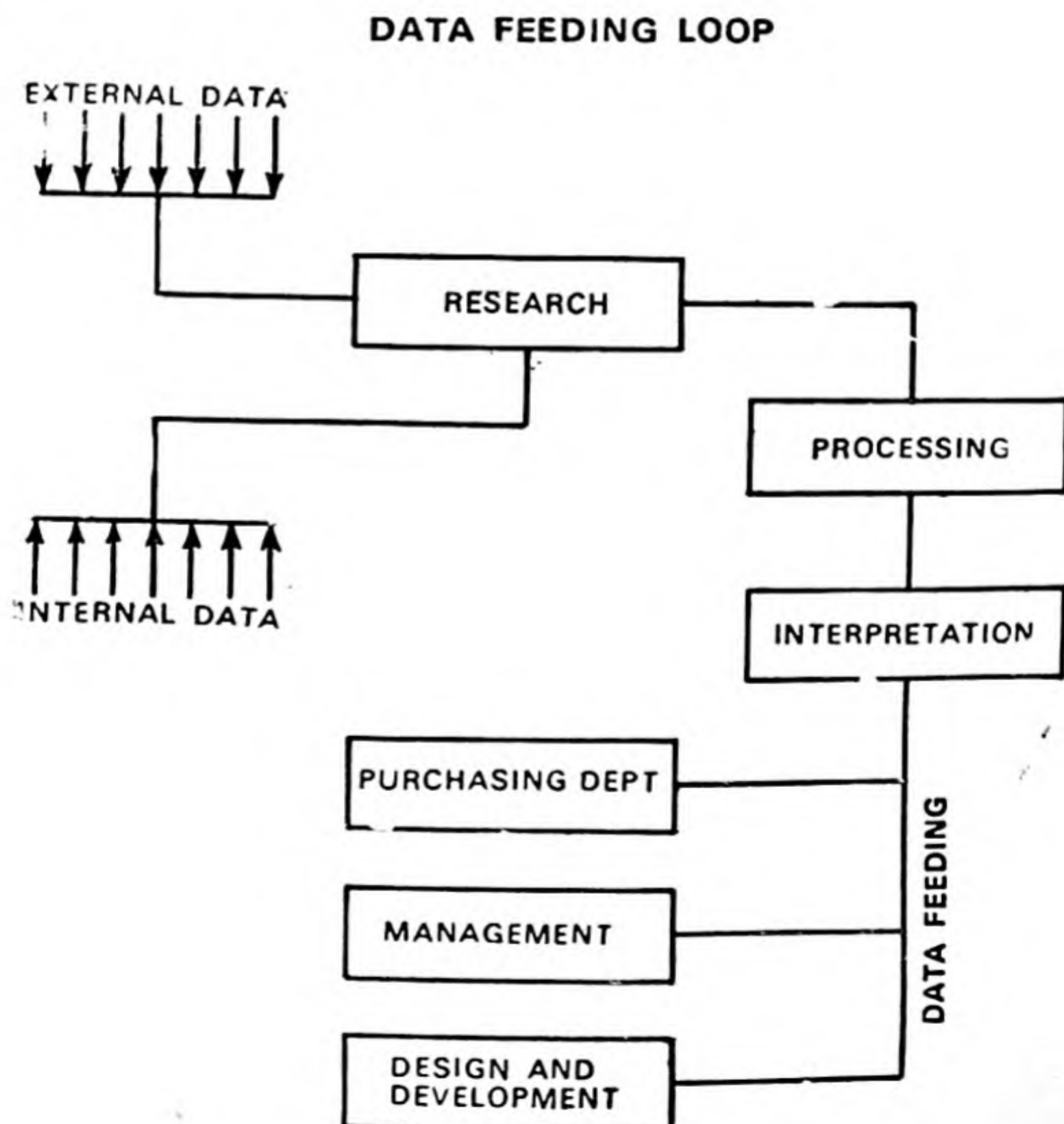


Fig. 3.

The whole system of 'Data Feeding Loop' can be made effective if all concerned take a positive view to visualise the situation in a positive way. For this, a considerable amount of planning and forecasting on market investigation, resource availability, engineering feasibility, life cycle of the market and the product, growth factor, price structure, political stability and instability, competition, monitoring and maintenance of suppliers' product specifications and performance, etc., is necessary.

In this chapter, some of the salient points necessary for the development and disposal of availability research work have been outlined. Some methods have been discussed and these can be used for setting up certain types of research work. The demand of modern industry is so great that, perhaps it has not been possible to cover all the probable points related to availability research.

The way technology is moving it has really become a great problem for the purchasing management to keep pace with this movement. Hence, possible solutions regarding the availability of materials have to be found out much earlier so that, whenever required, they could be found out without any loss of time. This can only be done through research and continuous research.

Part Two

Purchasing Activities

DEVELOPMENT AND DISPOSAL OF PURCHASING ACTIVITIES*

Man's ideas are never static, they are dynamic, flexible to new situation and aware of the differences in practical operation. With the expansion of industrial activities in our country, the wider acceptance and greater use of scientific methods in every sphere of industry have become necessary. Since the purchase of direct and indirect materials is the most important factor in industrial activities, it is needless to say that industrial organisations are keeping it in the very forefront of industry. If there is no effective control on the purchase of material, it is useless to put an effort on directing all activities towards some estimated goal.

A buyer's duty is not just to buy the material. It is one of his important duties to analyse the why, what, who, and when of procurement before placing an enquiry.

After receiving an internal indent, he should take care of the following facts :

1. Whether correct specifications are given on the indent with necessary drawings.
2. Whether this material could be substituted by any other material which might be lying somewhere in the organisation and which might not be known to the indenting department.
3. If the delivery time is short, he must not hesitate to contact the supplier and negotiate with the supplier. It has been observed in many cases that seeing the short delivery time the buyer refuses the internal indents. This is not appropriate. Sometimes due to change in planning, it becomes necessary to get the material at a short notice. Whenever possible, the buyer must accommodate the interest of the organisation which he is serving.

* Adapted from the author's article entitled "Development and Disposal of Buying Activities", published in *Indian Management*, New Delhi, June 1974.

4. The type of 'transport' involved in getting the material.

5. As far as possible the material should be procured from the local suppliers to avoid circumstantial difficulties and transport difficulties. Moreover, on-the-spot supervision can be made for different items ordered on local parties. They can also be chased more easily than outstation parties. Below is given an example from which one will be able to see how transport and 'long-distance' difficulties caused setback in the smooth running of production.

Some urgent materials were booked from Hyderabad by road transport for Calcutta. The supplier gave specific instruction to the transport company about the urgency of the material. But to his extreme bad luck, the truck in question failed to reach on time. Only on enquiry the customer came to know that even the supplier did not know the whereabouts of the truck. Is it not unfortunate? Then after one month the truck reached the destination with some plea which was not acceptable.

A sincere buyer with a dynamic outlook can help the management by giving his expert advice on the procurement of material, basing on long-range planning. Bad advice can cause an equally heavy loss to the company.

For instance, once one chief buyer advised the management to stock some raw material which, according to him, was essential to avoid 'future high price' as well as non-availability in the near future. But to his dismay neither the price rose high nor were the materials ever non-available.

Now, to keep an effective control on the various purchase orders, a proper record should be maintained. It is always advisable to follow the system with slider which is essential from the point of view of chasing. If proper cards are maintained for various orders in the above manner, it will be seen that various problems regarding progress, chasing, information can be easily solved.

However, efficiency and accuracy are the two main things which every buyer should be armed with. The overwhelming need is for all round efforts to reduce expenditure by greater economic and personal efficiency in order to stimulate a substantial increase in trade essential to produce a permanent solution of the problem. This should certainly be considered the ultimate goal. It will definitely be a bold and imaginative attempt to direct the activities of the organisations into constructive channels during the coming

years. Now, it will be the task of the management to see that work and efficiency go together in spite of all the complexities inherent in the system. But in saying this let us not forget that we have a wider responsibility than the management. Proper co-ordination and deployment of staff is absolutely necessary if the task is to be achieved.

Proper co-ordination between the Planning Department and the Buying Department is also required. It has been observed that lack of co-ordination often leads to a hold-up of production. Production Control Department should always keep the Purchase Department posted about the changes in production schedules.

Another thing which is generally seen is the non-harmonious deployment of buying staff in modern industries. The efficiency of the Buying Department in many cases depends on the manner in which the Buying Department itself uses its staff. If it concentrates, for instance, only on 'buying the material' in order to get the immediate results, it tends to ignore 'scientific upgrading'. The introduction and follow-up of scientific upgrading in actual operation becomes extremely difficult. A harmonious deployment of the buying staff, not only for 'buying the material' but also for investigation, information, introduction and check-up and the development work, might lead not only to quantitatively larger results but also make the Buying Department more efficient. Refer to Figs. 1(a) 'Before' and 1(b) 'After'.

Disposal of Purchase Staff Resources (11 Persons)

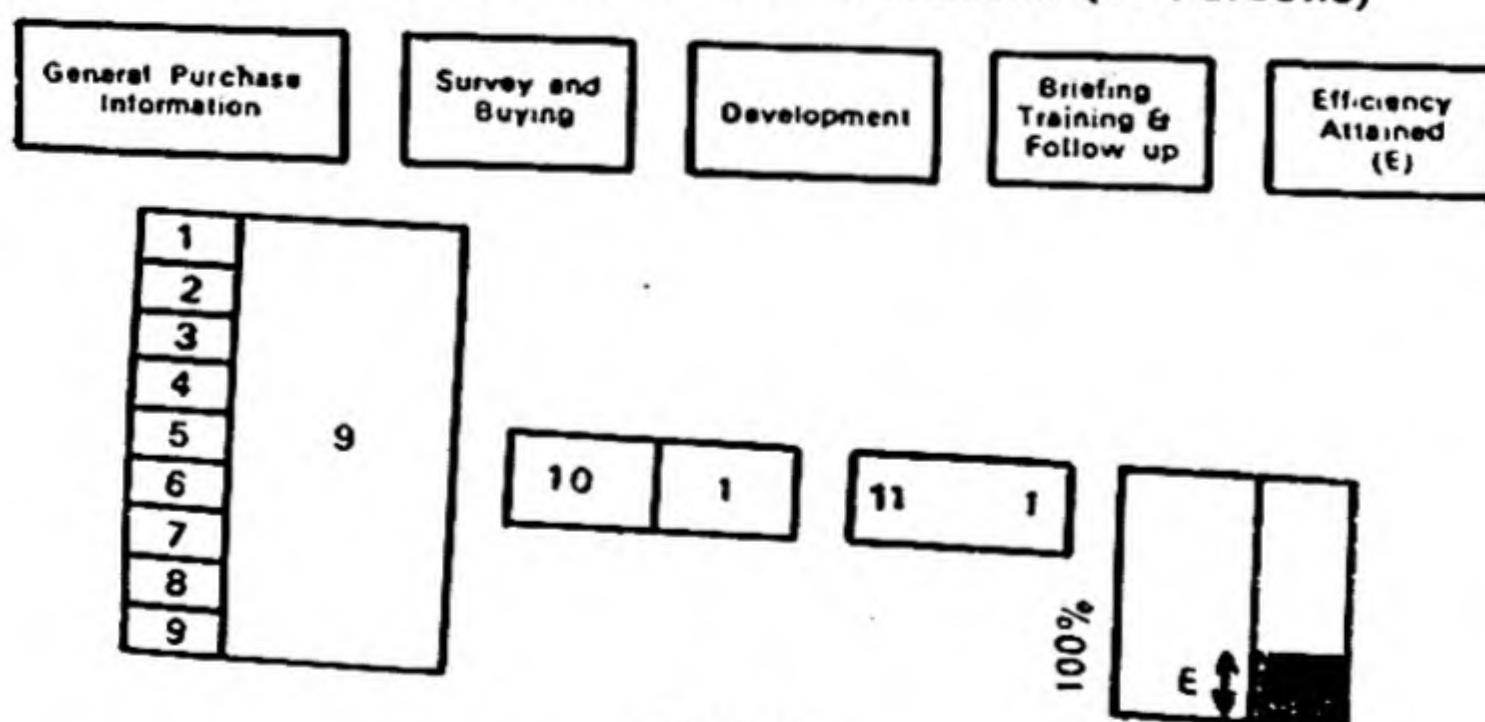


Fig. 1(a)

The Buying Department Incharge must have perfect knowledge of the capabilities of his staff. He must not do anything because of his whims. Personal performance of individual staff plays an important role in team-work. For instance, once a

Buying Department Incharge, just to satisfy his own whim, put one technically qualified economics graduate in card posting and

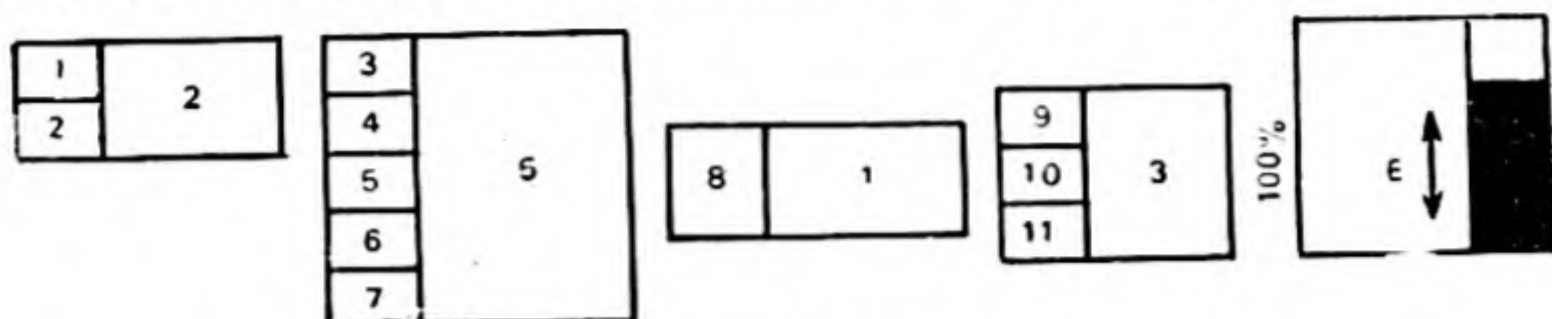


Fig. 1(b).

chasing work. Is it not mere wastage of talent and manpower? Hence proper disposal of buying staff plays a very important role in the purchase management.

The whole Purchasing Department should work like a team. The point which needs emphasis here is that everyone in the team should be involved in improving efficiency which will ultimately increase profits. The responsibility of improving efficiency rests with the team itself. It does not rest with any specialist group. Nor does it rest with the head of the department. The members of the department must have an opportunity to involve themselves and participate in improving efficiency and reducing cost. As a result of this involvement, the team will be able to take big efforts to achieve the target that they have set for themselves.

The systematic approach of the team should be as under :

AIM	:	What are we trying to achieve ? And why ?
INFORMATION	:	Facts, opinions, ideas relevant to AIM.
PROBLEM	:	What do we do next towards the AIM in the light of INFORMATION.
PLAN	:	How do we deal with the PROBLEM ? Who, when and where ?
ACTION	:	We carry out PLAN.
ANALYSIS	:	Have we dealt with PROBLEM to our satisfaction ? Have we achieved our AIM ? If not what do we do next ?

THE PLACE OF BUYER IN TODAY'S INDUSTRIES*

We can only pay ourselves what we earn by producing goods and rendering services, and to improve the supply of these we must produce more from our existing natural and scientific resources. There is no doubt that increased productivity is vital for the improvement of our economic performance both in industrial and agricultural fields. Everybody has got a direct role to play in this process. Until and unless an all-out effort is made to raise the per capita output, we shall not be able to come out from economic stagnation.

A buyer's role in the present-day situation is great—he can, by his own sustained effort, increase the overall efficiency of the organisation he is serving. A buyer is designed to support the management in the following ways :

- (a) By providing special economical and technical skills,
- (b) By making the management aware of the possible 'threats' to the economy,
- (c) By apprising economic and market conditions,
- (d) By balancing efforts to achieve optimum utilisation of resources to give economic profit while maintaining harmony, and
- (e) By achieving objectives through making optimum use of the abilities and potentialities.

Having recognised the need for providing efficient and improved services to increase the productivity in indirect labour areas, a buyer is then confronted with the problem of how to bring this about.

Work Targets

This simply means fixing the specific objectives of the department and determining programmes of action to achieve it.

*Adapted from the author's article entitled "The Place of 'Buyer' in Today's Industries", published in *The Indian Buyer*, Calcutta, March 1975.

Control is necessary to ensure that the planned objectives are achieved. This planning is necessary because buying activities are becoming more complex and critical due to hyper inflation, credit squeeze, raw material crisis, power shortage, government's complicated rules and time-consuming formalities, shortage of personnel, frequent changes in production planning, and transport difficulties (Fig. 1).

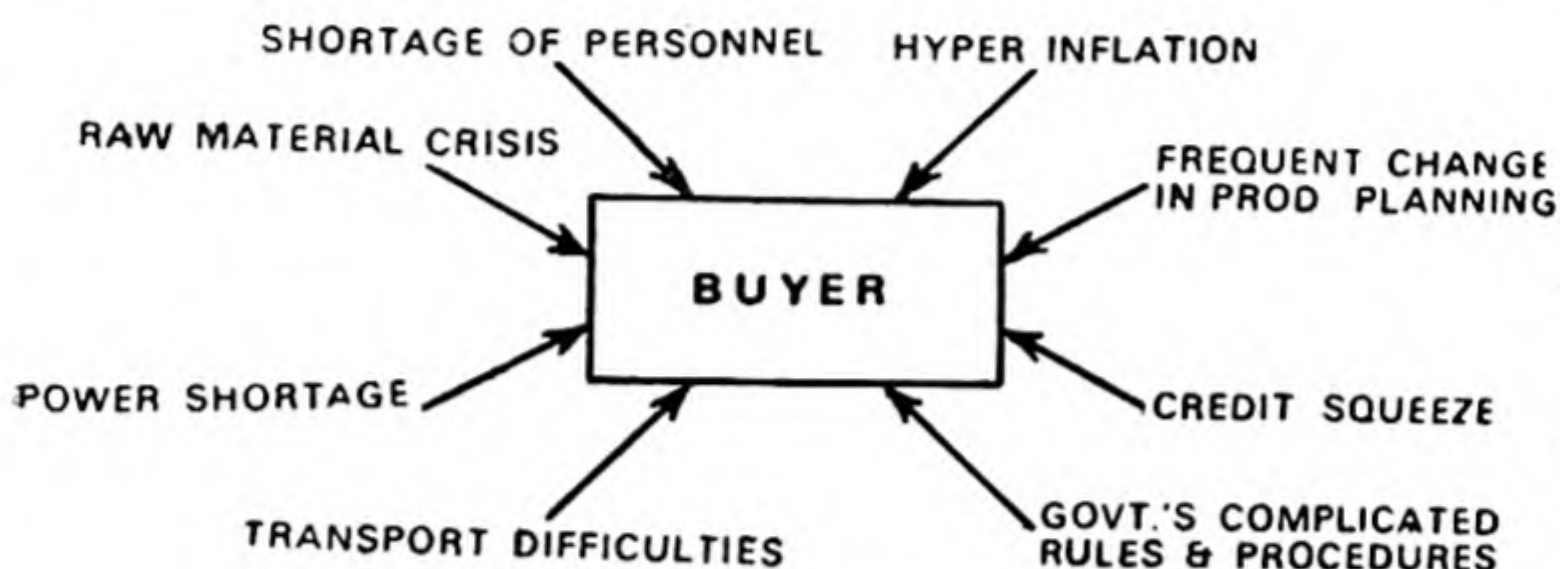


Fig. 1.

The continuity and uniformity of buying can be improved considerably by sound buying, planning and control—like production planning and control. Experience has revealed that in a number of industries in India, this area of operations is badly organised, badly executed or totally neglected. The area can be analysed as under :

(1) *Buying plans.* After receiving the indents, the buyer has to take an overall view of the company which is going to introduce a new product. He has to find out the time span between the beginning, that is, 'ordering', and the end, that is, 'receiving'. This time span, within its limits, would include a number of decisions resulting from the information received, until the eventual decision 'to buy' has been made. Any wrong decision at this stage will expose the organisation to serious consequences.

Before making the decision 'to buy', the following information should be properly analysed :

- (a) Whether it is a standard market product or it is to be fabricated?
- (b) What would be the market? Where is it?
- (c) What would be the market potential?
- (d) What would be the selling price we expect?

- (e) What would be the most likely methods of manufacture ?
- (f) What technical resources would be required ?
- (g) What resources would be involved in the process (man, material, money, method, machinery) ?
- (h) What royalties, licences, duties or other legal costs would be incurred ?
- (i) Whether long-term purchase agreement would have to be drawn up ?
- (j) Whether technical documentations (on which products would be manufactured or raw materials would be purchased) are clear ?
- (k) What sort of technical and management facilities would be required by the supplier ?

At this stage adequate information has obviously been generated to formulate the buying plan.

(2) *Negotiations*. This takes into account the agreement between the buyer and the supplier for effecting deliveries on the agreed price (taking into account the indenting department's requirements).

(3) *Scheduling*. This calls for a detailed analysis of the delivery commitments and scheduling them according to the order of their priority. In this case the buyer has to strike a balance between having too much money tied up in stock with fast deliveries on the one hand and an insufficient stock with slow deliveries on the other. In this connection, the factory manager of an equipment manufacturing company commented as under:

"The purchasing management is attracting increasing attention. The operational efficiency of most of the industrial organisations is largely dependent on the purchasing effectiveness. There are many aspects of the purchasing efficiency. Apart from ensuring reliable flow of materials, the quality of the purchasing items, prices, restricting excessive purchases, etc., are some of the important factors which deserve more attention. In a country like ours, there is invariably the inclination to purchase in excess of the requirements so as to reduce the stockouts. In this manner inventories, at times, tend to be high. I feel that purchase will have to orient itself in inventory control activities as well."

There can be no two opinions on the above comments. As a matter of fact, the 'buyers' of today are putting much stress on

it—as money has become scarce. On the one hand, they try hard to get the right material at right price at right time and, on the other, they take all possible steps to see that too much money is not tied up in inventories. For this the co-operation and active participation of the “salesmen” is most essential. Since the buyers buy the materials on the basis of production planning which has a direct bearing on sales planning, the salesmen have, therefore, to see that the finished goods are sold as per the sales planning. Money is generated by increasing productivity and profitability. Similarly it is also generated by faster sales. Regarding inventory, it is my personal opinion that one should not go in for complicated and big mathematical inventory theories—such as, inventory system with non-standard lead time and demand distribution, development of a buffer stock policy, decision rules in inventory control, safety stock with provision for expediting, and so on. In India we are not yet sufficiently armed with factors like demand pattern/lead time pattern, availability data, inventory carrying cost, order and receiving costs, advanced system of inspection, transportation and handling and lastly with production technology. When we shall be armed with all these types of systems and information, we shall perhaps be able to get accurate results from the various theoretical mathematical formulae of inventory control. If we analyse the industrial growth of the developed countries, we shall observe that the industrial growth and management techniques always maintain a correct and systematic pace; whereas in India, management techniques are going faster than the growth. Let us use our common sense and fix a stock standard policy on the basis of past experience and try to follow that rigidly as far as practicable and review the results once in two months. I am sure this will bring wonderful results. Now coming back to scheduling, the buyer diffuses his work content item by item so as to get the right material at right time. He generally categorises his work content into two or three stages, *i.e.*, simple and easy available items, complicated items, and items to be developed. The proper scheduling is made *stage by stage* for achieving the targets. One thing I would like to emphasise is that since a buyer works in a complex situation he will have to plan an integrated action. He needs a parallel planned action for neither the individual nor series of actions will have a full or sustained effect. Even in a quite small industry the buyer has less control over his environment than we tend to believe. He plays his part but it is no good expecting him to play others' parts too.

(4) *Co-ordination.* The role of a buyer is very important in an organisation. People form committees—they waste time, they slow down decision-making, they do not decide anything. The buyer is invaluable in co-ordinating the work of different departments and producing decisions which are best for the organisation as a whole. Not only that, it has been observed that the suppliers' difficulties are not properly appreciated by the people who are not directly linked up with buying. I would like to illustrate this with an example. Once an order was placed with a party for some wooden packing boxes. As usual, the party submitted the sample for approval before undertaking bulk production. While checking the inspector reported that one handle of the box though fixed as per the drawing was not acceptable to them, the reason being that the other party had fixed the handle in those boxes the 'other way' (which as a matter of fact was the correct way). Hence the buyer had to go to the design department for their comments. As usual the reply was, "We can't say anything now. We have to study, we have to investigate how the boxes have been accepted so long, we shall have to discuss the matter with the user department, and so on." No decision was given for this simple thing for five days. The buyer had to run about and co-ordinate the matter with various departments to get the ultimate decision that the handle should be fixed the 'other way'. As the complexities are growing in modern industries, difficulties are also growing at a rather fast speed. To overcome the difficulties one has to be armed with proper techniques. This change of climate can be seen not only in the field of industry but in the world at large. There is going to be greater questioning about the application of



Fig. 2

techniques which makes it more important that they are applied properly by qualified and dynamic people. All sides of the industry must take pains to understand and must be willing to make their positions and agreements understood. The positions are depicted in Fig. 2.

In order to evaluate developments in the field of buying, one has to take into consideration the external environment also. In the market place, there is a growing competition largely influenced by rapidly changing patterns of need and decreasing product life. This change in environment has brought a new dimension to the buying function. It needs a management system in which factors like speed, flexibility, creativity and participation will be of great importance. For our survival we have to find out the best ways and means, for only the best can survive. Didn't Darwin tell us that our world is characterised by the survival of the fittest?

PRODUCT PRICE PRECALCULATION AND NEGOTIATION*

One of the main objectives of an industrial organisation is to maximise its productivity. It requires a careful control of the resources. In order to control anything, one shall have to be in a position to measure it. When one has to make a choice amongst various quotations having large variations, it becomes essential that one makes a reasonable calculation so as to satisfy oneself that one is making the right choice. Now, the purchasing management has entered into a very critical stage—where the greater emphasis is on accuracy and efficiency. Whatever techniques are introduced by the management to improve the productivity of the organisation will go waste if materials are not purchased at a reasonable price. Hence, management has a big part to play in establishing and successfully maintaining a result-oriented purchasing unit in an industrial organisation.

It is a general practice of the purchasing department to place order on the person who has quoted the lowest. No doubt, it is more or less a sound practice. But before an order is placed the calculations of the person who has quoted the lowest will have to be checked, otherwise he may approach for a price increase or may try to back away. This will put the purchasing department in a most critical position, more so when the series is low and there is a single source of supply.

In this chapter, I have attempted to show that with a little bit of technical approach one can find out an estimated cost of a component. The method of calculation is simple and the reporting system is none too elaborate. This has been done to avoid offsetting of the economics which result from the increasing cost of administration. The approach outlined below may not be absolutely correct, but it will help to give the purchasing officer a

*Adapted from the author's article entitled "A New Approach to Purchasing Management—Product Price Precalculation", published in *The Indian Buyer*, Calcutta, March 1976.

reasonable idea about the cost. I have made an attempt to help the readers to assess its value in their own organisation.

A Basis of Product/Component Price Precalculation

(a) *Operating cost.* First of all, the purchase officer has to make out a Rate Index on the basis of the operating costs of small, medium and big units (of course, these are to be from the small-scale industries). This index may not be applicable to all the units and, therefore, the purchase officer has to use his own rational judgment in selecting three units. After having studied and analysed their activities, an estimation of operating cost is to be made as per Table 1. In Table 1, I have taken the case of a small

TABLE 1: Estimation of Operating Cost

Expenses			Rs.
Wages Including Bonus : 17 Persons			68,000·00
Provident Fund 8 33%			5,165·00
Gratuity 5%			3,100·00
Welfare Expenses @ Rs. 150 per head			2,550·00
Workers Clothing			1,280·00
Travelling Expenses			3,000·00
Conveyance			2,000·00
Stationery			500·00
Postage and Telephone			1,500·00
Small Tools			2,500·00
Maintenance of Tools			500·00
Power/Water/Steam/Gas			2,800·00
Auxiliary Materials			2,000·00
General Expenses			500·00
Fixed Assets :			
<i>Replacement Value</i>	<i>Life Class</i>	<i>Depr.</i>	Depreciation : 11,600·00
1,16,000	10 Yrs.	11,600	
Rent :			12,000·00
			<u>1,18,995·00</u>
Available hours per man per year approx.			
2,050 hrs :			
2,050 hrs. × 17 persons			
= 34,850 hours			
Rate per hour = $\frac{\text{Rs. 1,18,995·00}}{34,850 \text{ hours}}$			
= Rs. 3·41/hr.			

unit with moderately good organisational set-up. Similarly, for the other two types, an estimation can be made on the lines shown in the table. Where the correct figures are not available, an analytical estimating is to be done on the basis of experience.

In my analysis, I have come to a figure Rs.3.41 as the operating cost per hour. This figure has been applied to price precalculation of a component (Brass Socket), on the total ordered quantity of 2,400 pieces.

(b) Price precalculation. In this process a small degree of overlapping may appear to exist between the sequences, but for the purpose of discussion it is convenient to consider them as distinct. These sequences are :

- (i) Identifying the logical operations and elements.
- (ii) Making analysis as to how the operations are performed.
- (iii) Analysis of critical and non-critical activities.
- (iv) Identification of bulk motions of the critical activities.

In Table 2, I have tried to show the sequences and the method of precalculation after getting the necessary details of materials as shown in Part A. One should break down the operations to as many number of elements as possible, and estimate the time required to carry out each element. With every phase of operation, the normal setting time has to be calculated. Then the total time has to be converted into total labour and overhead by multiplying the total time and rate/hour (operating cost as detailed in Table 1). Then the cost of tools, jigs and fixtures is to be added. If there is special finishing like plating or painting that cost is also to be added. Elements like packing, forwarding, profit and any other unforeseens are matters of judgment. These depend on the type of work, the type of organisation, the type of delivery, etc. Through this process, one will perhaps be in a position to arrive at a cost which in my opinion will be reasonably fair. From this precalculated end price, the comparison can be made with the prices quoted by the suppliers, and negotiations can take place wherever the purchase officer feels necessary.

In modern times, there has been a continuing improvement in the efficiency with which purchase department's work is carried on. If we compare a particular job of today with that of a year ago, we shall definitely find an overall improvement. This is mainly due to the awareness of the purchasing staff and their attempts at the systematic application of disciplined thoughts to the problem of achieving improved work efficiency by removing inefficiency. Increased efficiency stems from an improved working environment where greater emphasis is on organisational planning, allocation, control and cost consciousness. The last few years

TABLE 2 : Price Precalculation

Date :

DESCRIPTION : Brass Socket					CODE NO. : ACC BAX 2293	
MATERIAL : 7/16" Brass Hex. Rod.					PRICE : Rs. 2,800/100 kg.	
A	SIZE	: 16mm × 10mm	TOTAL SERIES		: 2,400	PRICE PER 100 pcs Rs.
	WEIGHT PER 100 pce	: 1.69 kg.	YEARLY SERIES		: 2,400	
	REJECTION 3%	: .05 kg.	PRODUCTION SERIES:		200	
	GROSS TOTAL	: 1.74 kg.				
PRICE/100 PCS : → → →						48.72
MATERIAL HOLDING COST 10%						4.87
B	OPERATIONS	APPROX. Time : mts	ALLOW- ANCE Time : mts.	TOTAL Time : mts.	RATE/ HR. Rs.	COST Rs.
	A Feed, spot, drill, u/cut, cut-off checking etc. (including setting time)	175 mts				
	B Feed, threading, etc. (including setting time)	64 mts				
	C Checking	30 mts				
		269 mts	10%	295	3.41	
						TOTAL
TOTAL LABOUR AND OVERHEAD						16.76
C	JIGS & FIXTURES : APPROX. Rs. 300					12.00
	TOOLS					
AMORTISATION: $\frac{\text{Rs. 300}}{\text{TOTAL SERIES 2,400}} = \text{Rs. 0.12 per pc} \times 100 \text{ pcs}$						15.00
D	FINISHING : Zinc plating & chromate passivation Rs. 15 per 100 pcs					97.35
E	SUB-TOTAL					7.00
	RECEIVING & FORWARDING APPROX.					5.22
	UNFORESEEN : 5%					109.57
	TOTAL					21.91
PROFIT 20%					131.48	
PRICE PER 100 pcs						

have seen severe inflation in major areas of the world giving rise to fluctuating influences on cost prices. It is therefore necessary to keep a watch on the trend of the costs to be incurred in making and selling a product. In this Chapter, I have tried to give a general idea about the cost structure of a boughtout product from a small-scale unit for the purpose of comparison with the quotations received by the purchasing officer and to carry out further negotiations.

AN APPROACH TO THE PURCHASING ACTIVITIES*

Platonic theory of functional specialisation was based on the reciprocal needs of human beings and the necessity of division of labour. Societies spring out of the needs of human beings. There are different types of wants of human beings in a society. Nobody can, by himself, meet all his wants for lack of capacity and time. There must, therefore, be co-operation and mutual exchange of services based on specialised knowledge and functions. Specialization helps to promote efficiency, speed, motivation and discipline. In recent years it has been observed that the various complexities in the economic field have made 'purchasing' all the more important. The old idea of "buy the material and supply it" is no more a purchase function. It now calls for analysis at every stage—and this 'analysis' has made purchasing activities a specialised function. The people who are involved in these activities are specialists. Clearly, it is now the responsibility of the management to ensure that the structure of the purchase department is fully prepared for the multifarious technical and economic activities. "The ultimate goal of management from an economic point of view is to maximise the profit of the enterprise. This goal cannot be reached by merely following a 'well-established routine'.¹ It constantly requires decision-making to choose between various possibilities." Hence the management of today, particularly of tomorrow, has to take decisions in which way they would like to direct their purchasing activities.

Development of Table

After a detailed analysis of all the appropriate data relating to principles and factors of purchasing, a draft based on economic viability should eventually be prepared. Then the draft table should be circulated to Finance Department, Work Study Depart-

* Adapted from the author's article entitled "An Approach to the Purchasing Management", published in *The Indian Buyer*, Calcutta, September 1975.

ment and Personnel Department. Next it is to be applied to typical jobs as a part of preliminary exercise. Then it is to be amended in the light of the results and again adopted for extended trials. If the results are acceptable it is to be finalised and embodied in the activities. An important fact to be kept in mind is that if someone wants to draw maximum benefit out of a new system, he must be prepared to accept it in its totality. A half-hearted acceptance/approach will not only do harm but jeopardise the whole system.

PURCHASING ACTIVITIES TABLE

The table consists of four separate sections :

- I. Principles.
- II. Responsibility.
- III. Organisation.
- IV. Research, Development and Application

Section I

Principles :

1. In this complex world the growth of a company demands 'concentrated' activities. A principle therefore has to be laid down regarding centralised and decentralised activities.
2. Careful selection of purchasing staff.
3. Conscious career planning for the purchasing staff.
4. Co-ordinated function—due to rapid advancement in technology.
5. Cooperation for growth.
6. Development of vendor activities.
7. Payment policy.
8. Stock policy.
9. Buying policy.
10. Purchase-Expense relations.
11. Control of expenses.
12. Pattern and measurement of the economic flow.
13. Quality and reliability for better performance.

Section II

Responsibility :

1. Budgeting.
2. Short-range and long-range budgeting (based on company's production policy/planning).
3. Centralised negotiation and decentralised negotiation.
4. Long-range contracts.
5. Short-range contracts.

6. Normal purchase.
7. Immediate purchase.
8. Development of small-scale suppliers.
9. Technical assistance to third parties.
10. Financial assistance to third parties.
11. Management assistance to third parties.
12. Disposal of scrap material after careful activity study.
13. Management Information Service.
14. Economic condition analysis.
15. Market condition analysis.
16. Advising on vertical integration and 'buy' or 'make' decisions.

Section III

Organisation :

This varies from company to company. Hence its details are not enlisted.

Section IV

Research, Development and Application

1. Resource analysis.
2. Analysis of work content and system.
3. Influence of environment.
4. Learning, advancement.
5. Job design.
6. Job rotation.
7. Job enlargement.
8. Job enrichment.
9. National and international market trends.
10. Forecasting and analysing.
11. Scrap minimisation.
12. Operation evaluation to determine economic growth.
13. Application of research work (the frequency of each element is very important).
14. Creation of procedure, standard, procedure chart.
15. Standardisation.
16. Computer application.

In this connection it is to be remembered that this table has been worked out by a conscious and careful activity of study. But it may not be comprehensive and there may be some other points also. All the points together will perhaps be able to outline a perfect Purchasing Activities Table.

"We see a continuous change in the applied process (process in the most extensive sense of the word). Entirely new processes are continually being generated; at the same time, the existing processes keep on getting improved in the course of preparation and execution. In this connection *new* questions are constantly arising as regards the design of the process, process performance standards and operators' training."² Hence, we can definitely say that there is no 'process' or 'method' which can be called the 'final' or the 'only' process or method. Ideas and thoughts are changing to keep pace with the technological changes. He who will be able to keep rhythm with the changes will be most benefited.

Training

Both residential and non-residential courses on purchasing management are now available at various places. Since the inception of such training programmes, executives, managers, supervisors, assistants have attended various courses. So we can say that a very broad cross-section of people from purchasing management have perhaps been covered by these courses by now.

Professor Norman Dudley in his article "Characteristics of Work Performance" wrote: "Many of those managers who should now be interested themselves in applying some of the more sophisticated mathematical techniques had no real understanding of basic principles. There is clearly a need for more refresher courses for senior management executives and executive staffs not only on specialised techniques but also on entire production systems, so that the interaction of their function with those of others may be better appreciated and the problem of reconciling sectional objectives be better understood."³ If the managers and executives are properly trained, they can accordingly train the people working under them for a better result. So far only a few organisations have made training arrangements for the purchase personnel. It has perhaps been observed that most of the purchase personnel have not even seen the items which they are purchasing. Most of the persons do not know their use/application. If the purchasing people do not properly know what they are buying, it is something like growing a tree without knowing what fruit it will bear. Hence, it is absolutely essential that people working in the purchase department get in-plant training. The purchase manager should take all possible steps to see that his personnel are properly trained. Sir Max Bemrose, Chairman and Chief Executive of Universal

Printers Ltd., U.K., writes in his paper "P.O.P. Management". "Many large firms rely on the personnel department or training officer for their management training. In Universal Printers it is our declared policy that anyone who is a manager, at any level, is responsible and accountable for the training and development of those who report to him. Of course, if he wishes, he will consult the personnel or training officer, who may undertake some of the detailed training."⁴

Reliability

In the industrial sphere of activity, reliability of equipment is becoming a problem and is meriting a high order of priority. Today, an expensive piece of equipment can fail completely because of the failure of one small component. Reliability of equipment primarily demands a high order of reliability of its components. This is the area where a purchase manager and his staff have much to offer. They are the people who are mainly responsible for procuring reliable components on the basis of specifications furnished by the development/design engineers. Reliability now forms a part of the purchase management.

Following are the causes of unreliability :

Class 1. Use of unsound components or piece parts.

Class 2. Complexity—operational and technical.

Class 3. Faulty design.

Class 4. Fundamental faults.

Class 1. This can be minimised by sound component design and careful testing of materials and finished components, and sustained quality control. Unfortunately, due to non-availability of proper raw materials, qualified technicians and paucity of funds. It becomes extremely difficult to get reliable components and piece parts. Further, environmental conditions play an important part in the overall reliability of components and piece parts. Environmental test laboratories are not available as per requirement. If the suppliers are not in a position to evaluate their components, how can they be sure about their reliability.

Class 2. "It would seem that engineers, in striving primarily for performance, tend to lose sight of reliability."⁵ The engineers who are designing an equipment should try to see that the equipment is simple and can be operated with minimum hazards. "The primary reason why increased complexity has resulted in lower reliability is that, with more piece parts, there will inevitably be more failures."⁶ However, at present since we shall have to live with complexity, it is the primary duty of the designers to

review the characteristics of the various types of equipment with a view to eliminating desirable but not essential functional requirements. This will help to produce less complex equipment which is easier to produce, easier to operate and easier to maintain. Further, designers of our country have to see that what they are designing is within the technological reach of the fabricators.

Class 3. Faults may arise due to faulty mechanical design, circuitry design, electrical design, and so on. It is very important that feedback information due to failures is properly passed on to the design department, so that corrective actions could be taken accordingly. For this the personnel of the purchase department have to keep a close contact with the suppliers, and the sales personnel with the ultimate user of the end-products.

Class 4. Faults can be reduced only through sustained research work so that the components can be developed to meet the more stringent demands, application of which is ever increasing. Points of reliability and unreliability have been discussed. It is the fundamental duty of the purchasing department of an organisation to see and co-ordinate the work in such a way that they procure only reliable components as far as possible. For this, they shall have to educate their suppliers. They shall have to insist on them that they should supply reliable components, which is the only way to survive in this competitive world. There is no doubt that the personnel working in the purchase department of various organisations are struggling very hard to overcome countless problems related to reliability, outcome of which may be the measure of ultimate success.

It is a fact that the purchasing techniques are now changing faster than ever before. We shall have to constantly review our position to keep pace with the faster movement. The Materials Management Association must now provide facilities for keeping its members fully up-to-date, otherwise in the years to come they will have only a fraction of the knowledge necessary for purchasing. It is through this association alone that the interchange of techniques, thoughts and ideas can take place.

Standards

Irwin Vigness, of U. S. Naval Research Laboratory wrote in his paper "Present Status of International Standards for Shock and Vibration Specifications", "... when there is an interchange of goods between nations, it is necessary that standards be

developed so that different items will be compatible with each other.”⁷ This is also applicable when there is an interchange of goods between two organisations or persons. There is no doubt that a good deal of work has been carried out on national as well as international standards—but how many purchasing organisations are keeping themselves acquainted with the standardisation publications? Standardisation of specifications is an absolute necessity. It avoids, at the time of purchase confusion regarding the quality of a product which may have many varieties of nearly same specifications.

Interpretation of standards: Different materials/components have different standards. If the man who is purchasing material/components cannot interpret the standards, how can he do his job efficiently and effectively? How will he be in a position to realise the difficulties in achieving the standards? Hence this factor has entered in the modern purchasing management scene to compel the purchase personnel to pay more attention to this aspect and get themselves educated properly. And it does not merely educate, it contributes to industrial efficiency as well.

As far as we in purchasing management are concerned, the danger that we face is that different problems require different solutions and there is bound to be some overlapping in techniques. This can sometimes make the purchasing activity unbalanced. However, with our skill, knowledge, education, sincerity, devotion, honesty and integrity we can certainly try to bring it back to a point of equilibrium. For this there is a strong necessity of co-operation from the people working in other sections of industry off. “A close analysis of the doctrine of evolution makes it clear that human species develop not only by his own power to struggle but also by his association with the fellows”.⁸ This basic fact has to be kept in mind by all the people who are working in industry. And at the same time, everyone should ensure that maximum efforts are made to bring the greatest benefit to their organisation.

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AIDS FOR PURCHASING ACTIVITIES*

In this age of technological evolution, those who will be able to give quick and effective solutions to the problems will be highly regarded and well rewarded. The increased complexity of modern technology has brought changes in application of methods and techniques where the emphasis is on greater accuracy and more precise performance. Today, industry is spending a sizable amount of money and resources in solving various problems related to production and productivity. This has become necessary to fight the various adverse conditions which have been trying to cripple the industrial economics. Hence everyone in his own sphere has to see how best he can give ; he must take pains to understand and must be willing to make his position and agreements understood.

Last few years have been difficult years for the people who are working in purchasing departments, as they have to procure the materials under the adverse general economic condition so as to feed and keep the production lines running. Coming years may be even darker. Therefore, from now onwards, this department has to be geared up so that new challenges even under adverse conditions could be faced easily.

Now let us examine how various simple techniques can help the planning and improving of material management. This examination is, however, based on my own analysis and, therefore, may not be the last word. Nevertheless, I have made an attempt to help the readers to distinguish between these new methods and assess their value in respect of their own organisations.

Crashing of Activities

Let us look to the problems typical to the purchasing department. Before starting a new project/production, the management often calls the purchase manager to get his opinion/advice about

*Adapted from the author's article entitled "Aids for Purchasing Management", published in *the Indian Buyer*, Calcutta, January 1977.

the availability of materials and more precisely the time required for the procurement. The production planning or project planning is then based on the time schedule given by the manager. For general items it is not so difficult to give an answer across the table, but for the complicated items it is better that the manager crashes the activities involved in procurement and then gives the answer. Further, this crashing of activities will be helpful for him, for his own planning and progressing at a future date.

For example, let us take the case of a rotary switch, which as per the engineering division is very complicated and requires much effort to procure it, as various stringent specifications are incorporated in it. Under the circumstances and for simplicity, let us assume that the activities that need to be carried out are as detailed in Table 1.

TABLE 1

Activity No.	Activity Details	Most Likely Time (Weeks)	Remarks
1.	Receipt of drawings/ specifications from the design department	0.5	
2.	Scrutiny of drawings	1.5	
3.	Enquiries	3.0	
4.	Investigation	1.0	
5.	Quotations received	4.0	
6.	Analysis of quotations	0.5	
7.	Placement of order	0.5	
8.	Tools and jigs fabrication by supplier	20.0	
9.	Piece parts checking	1.0	
10.	Rectification I	2.0	
11.	Assembly	0.5	
12.	Prototype submission	0.5	
13.	Checking of quality and reliability	2.0	
14.	Rectification II	1.0	
15.	Submission of 2nd sample	1.0	
16.	Checking of quality	1.0	
17.	Prototype approval	0.5	
18.	Submission of 1st production sample	1.0	
19.	Sample approval for bulk production	2.0	
20.	Starting of bulk supplies	4.0	
21.	Checking by Incoming Inspection	0.5	
22.	Materials in Stores	0.5	
Total Time:		48.50	

The result will be better if the activities are crashed to as many number of elements as possible. After crashing, a reasonable estimation of the time to carry out each activity is to be made and put against each activity for arriving at the total time

required for the whole process. In actual operation, it will be the duty of the purchasing people to see how reduction in time could be made in each activity so as to reduce the overall time.

For controlling the progress, these activities are plotted on graph paper with the path along a time scale as depicted in Fig. 1. It will enable us to see at a glance the latest position of the activities. By these means, it is possible to process the various activities against the calendar and ensure that the completion dates are observed. However, in this connection one thing is to be kept in mind: "All factors cannot be quantitatively determined with a sufficient degree of accuracy to eliminate the element of risk in decision-making. Sometimes the limitations result from practical considerations.....Scientific methods of measurement and analysis do not eliminate the taking of certain elements of risk; but when fully understood and adequately utilized, they provide the basis of rational decision."¹

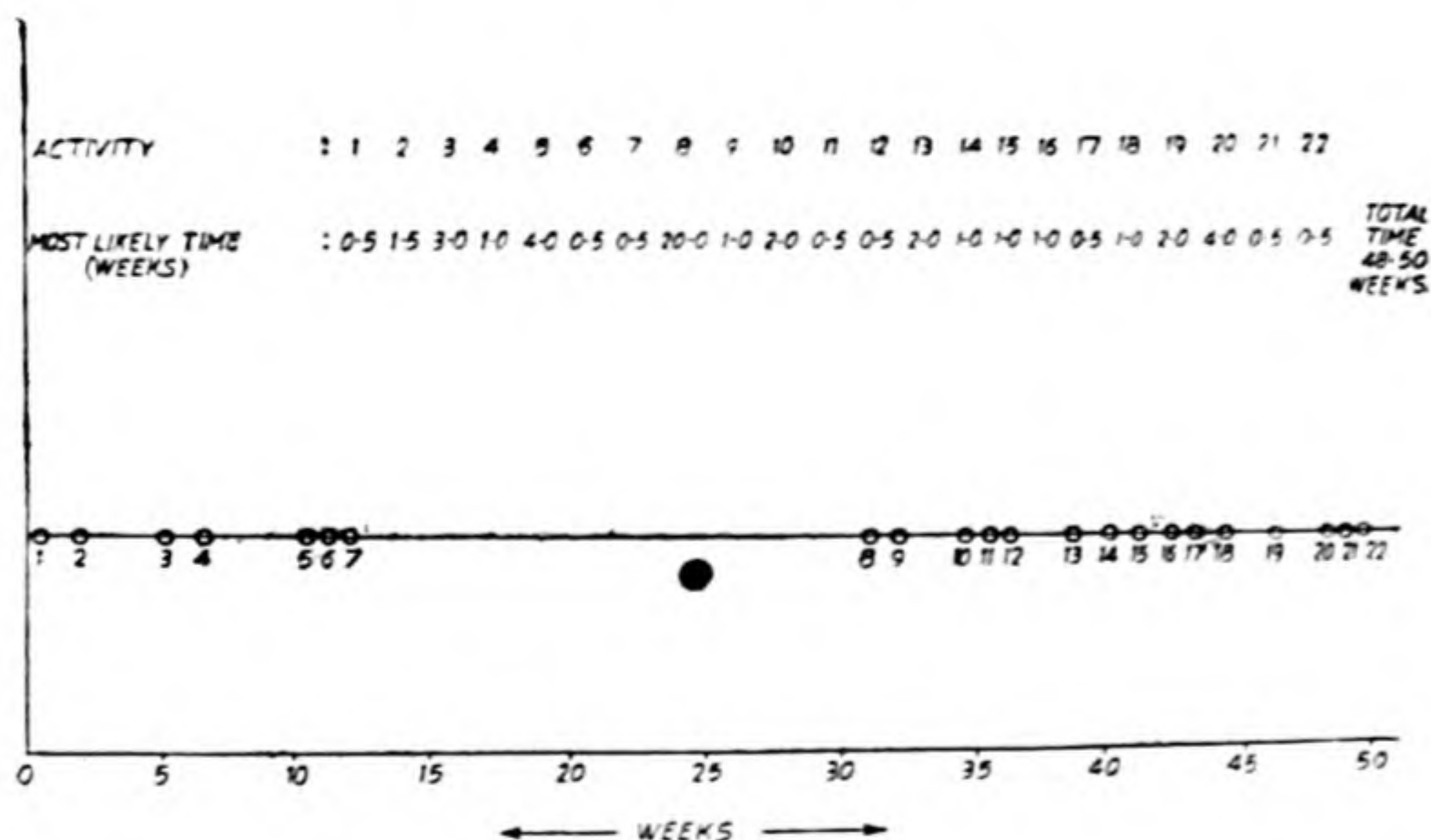


Fig. 1.

Integrated Problem Solving Procedure

Quite often it has been observed that a number of complex problems make the manager of a purchasing department completely baffled. Each problem has its own peculiarity and calls for a separate decision. Before taking any decision, the manager must determine what is needed for the decision to be made, *i.e.*, what actions are necessary for solving the problem. One simple

way for the manager to solve the problem is by itemising the actions as depicted in Fig. 2.

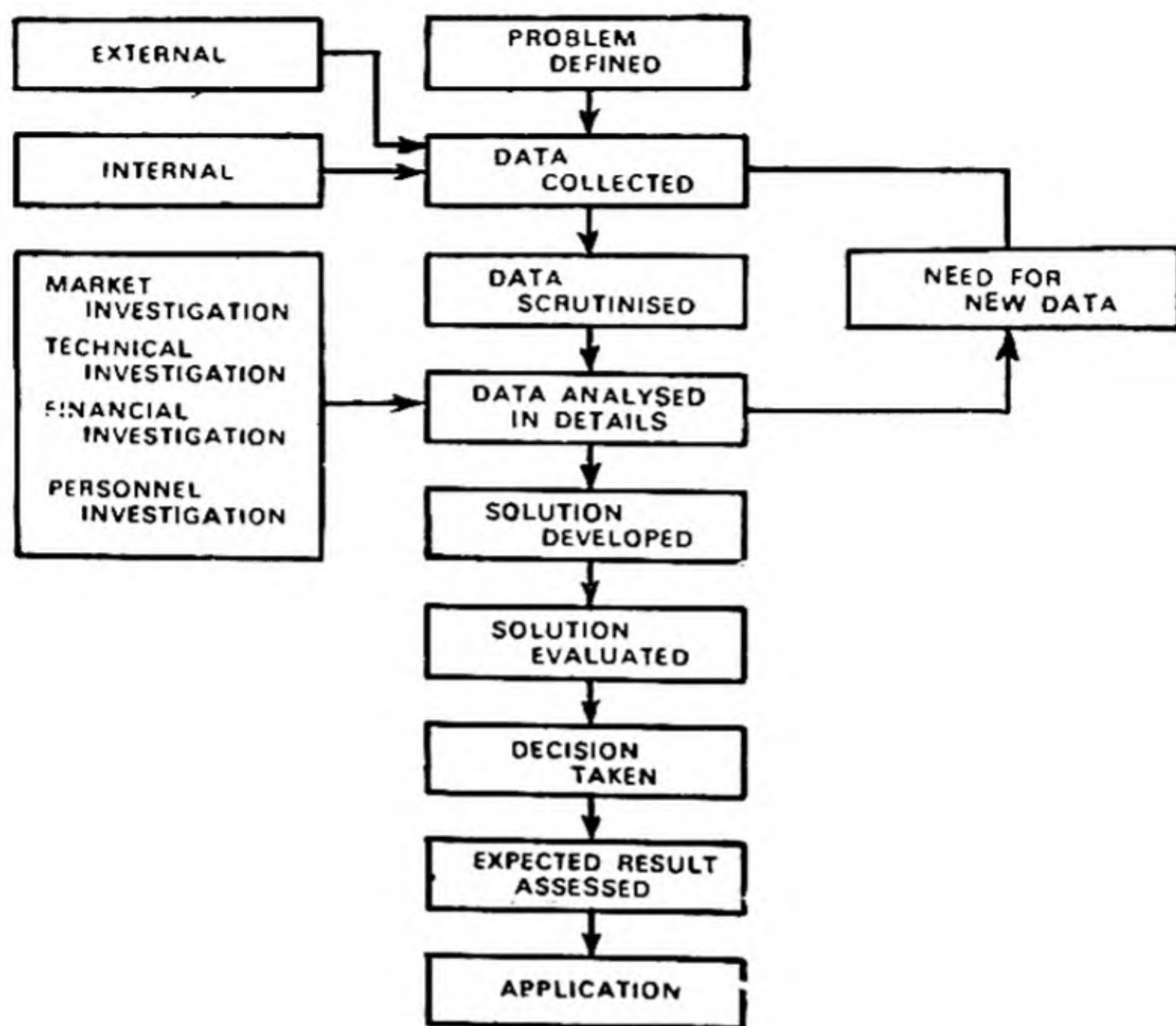


Fig. 2.

I have termed it as Integrated Problem Solving Procedure because, in my opinion, this chart is an integrated one which is applicable to all the problems. This procedure is so general that this can be applied to any element of a system's structure or performance for a meaningful solution and application thereof.

Operating Cost of the Department

In industry, management reacts very sharply if there is a loss in working hours of the production line. It is quite obvious that there are reasons for such reaction but in this process we should not forget that the loss in hours of other service departments is also equally important. In my opinion the managers of every purchase department should know what is the per hour operating cost of his department. This will be a constant reminder for him to act--whether the work is productive or unproductive. He

will be in a position to know where he stands and how he will act. Being a service department, especially when it is difficult to find a cost statement which shows the operating cost, there is a general tendency (which is natural in human-beings) to take life easily. In Table, 2 I have tried to formulate the operating cost (per hour) of a purchase department by using some hypothetical

Table 2 : Yearly Expenses of 'A' Purchase Department

<i>Sl. No.</i>	<i>Expenses by Category</i>	<i>Rupees</i>	<i>Explanation</i>
1.	Salaries—7 persons	1,50,000	
2.	Welfare expenses @ Rs. 1,550·00	10,850	
3.	Gratuity @ 5%	4,400	
4.	Provident Fund @ 8·33 %	7,400	
5.	State Insurance	1,500	
6	Quota in		
	(a) Technical Management	15,000	
	(b) Personnel Department	5,000	
	(c) Accounts Department	5,000	
7.	Stationery	8,000	
8.	Travelling Expenses	15,000	
9.	Motor Car Allowance	6,000	
10.	Postage, Telegram, Telephone, etc.	4,000	
11.	Conveyance	5,000	
12.	Books and Periodicals	2,000	
13.	General Expenses	3,000	
14.	Repair and Maintenance	1,000	
15.	Rent 45M ² (Air-conditioned @ Rs. 260/-M ²)	11,700	
16.	Fixed Assets Depreciation	3,000	
	TOTAL	2,57,850	
<p>Available hours per man per year : 2,050 hrs. $2,050 \times 7 \text{ persons} = 14,350 \text{ hrs.}$ Rate per hour : $\frac{\text{Rs. } 2,57,850}{14,350 \text{ hrs.}} = \text{Rs. } 17\cdot96$</p>			

data. I do hope that the people will act logically if these operating costs are known to them. This data will act as an aid to the purchase manager in achieving the dual aim of :

- (1) stimulating the people in his department to achieve a reasonable output.
- (2) assessing the cost of a project which his department intends to undertake.

It is rather impossible to lay down any norm which would make the choice of the right 'aid' applicable to any and every particular problem or situation. In all cases a choice must be made according to the conditions, the type of problem to be tackled, the type of people available and many other criteria. "You know there is no short-cut or magic formula which will solve all the problems which beset management today, nor indeed is there any ultimate or final solution. In a dynamic world the very nature of our problems is constantly changing. All we can hope to do is to make a modest contribution, day by day to the problems as we see them."²

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SELECTION OF SOURCE OF SUPPLY*

As already stated, an industrial organisation is a system where materials are consumed as well as produced. This calls for procurement of materials in an effective way so that consumption can be carried on in a planned way for better results. The main objective of any industrial organisation is to maximise productivity. In order to achieve this, we must analyse all our deficiencies and make endeavours to develop methods (directly related to economic principles) which could overcome the deficiencies and help attaining higher efficiency.

In recent years, due to various and varying adverse conditions the operational efficiency of many companies has come down though they have tried their utmost to overcome these adverse conditions. With the increase of technological innovations complexities are bound to grow, and its impact is going to be felt not only on the technology itself but also on the economy as a whole. To avoid this and future complications we shall have to make ourselves ready with the movement of time. It is a difficult task but certainly not impossible. Everybody in his/her own sphere has to see how/what best he or she can contribute to maximise the productivity of his/her own organisation.

A rational selection of the source of supply in the field of purchasing plays a vital role, as this factor alone can contribute much to the operational efficiency of any industrial organisation. Many a time it has been observed that non-availability of materials or supply of incorrect materials has not only caused production bottlenecks but also caused serious labour unrest. If the situation is carefully analysed, it will be seen that much of it has been due to the selection of a wrong source of supply. In selecting the source of supply, a buyer's decision not only influences his organisation's operational efficiency but also its economic success.

* Adapted from the Author's article entitled "Selection of Right Source of Supply" published in *Industrial Times*, August 16, 1976.

There are a number of various factors that pose problems in identifying the dependable source of supply—be it a large, medium or a small industry.

Varying Problems

Where there are activities, problems are bound to rise—and where there are problems, solutions ought to be found and dressing carried out in such a way that the solutions are more potent than the problems.

In the field of buying the following are the most intricate points in selecting a source of supply:

1. Financial instability,
2. Lack of quality discipline,
3. Geographical position,
4. Labour relation,
5. Rigid sales contract,
6. Monopoly,
7. Size.

1. *Financial instability.* While evaluating a vendor, a buyer generally assesses his financial position. If he finds that the financial position of the vendor is not satisfactory, generally he does not place any order with him. Unfortunately no vendor, especially in the small-scale sector, is fortunate enough to be in a satisfactory financial position—though many of them have got varied technical expertise, moderately equipped factory, integrity and honesty. Now will it not be unwise to neglect such a supplier and select a vendor who has got financial stability but not the other disciplines? Under the circumstances, it becomes really a problem to make a correct decision in selection.

I know a case where the buyer selected a vendor who did not have financial stability but was qualified in all other respects. The buyer rendered financial assistance to the party who in turn developed a most complicated panel sealed type rotary switch which used to be imported earlier. In this case if the buyer had rejected this supplier, he would definitely have lost a very good and potential vendor.

Though 'finance' is the most important factor in evaluating a vendor, a buyer should not reject outright a vendor on this ground if he (vendor) is sound in other aspects. Judging the other aspects is of course very difficult but not impossible.

Recently I made a survey on the financial position of 10 small-scale and 2 medium-scale industries. Surprisingly not even a single one was financially sound. Since we shall have to live with what we have, it will be better to see how best we can utilise what we 'have'. This calls for a systematic approach to the problems for a meaningful solution.

In my opinion it is the duty of the buyer to give financial assistance to a vendor who has got potentialities. It will be to his own advantage. Secondly, wherever possible, a buyer should guide the vendor in locating suitable financial institutions that could help him.

2. *Lack of quality discipline.* In the field of buying, quality plays a dominant part both in meaning and application. Quality refers to the suitability of an item for its intended purpose. A supplier may be able to supply the desired quantity as per the schedule but the quality of the supplies may not be as per the required specifications, *i.e.*, not suitable for the intended purpose.

Experience has revealed that the quality cost in the field of buying is very high. Here by quality cost I mean the costs associated with the visits to vendor's factory, sample approval cost, inspection cost, cost associated with defective products (such as unusual inspection procedures, rework on rejected parts, loss due to non-availability of quality products).

For example, 1.0-mm thick synthetic resin bonded paper (Electrical Grade) was prescribed for insulation of heat sinks (used for power transistor). Accordingly an order was placed on a renowned manufacturer for supply of materials as per their quoted tolerance, *i.e.*, "tolerance ± 0.11 mm on nominal thickness of 1.0 mm." Surprisingly when the materials were received the incoming inspection department observed wide variations in thickness at different places of the same sheets. It measured from 1.18 mm to 1.30 mm. Since the material was urgently required for production these were accepted as a special case and necessary grinding was done at the buyer's place so as to bring the thickness within the usable limits. This is an example where both quantity and quality costs are involved.

To determine the quality standard/consciousness of a supplier is really a difficult task. This is not only applicable to the small-scale suppliers but also to the large-scale suppliers. To procure standard quality products over a period of time within a reasonable price in our circumstances is not an easy job. The Factory

Manager of a leading electronic equipment manufacturing organisation of India once commented, "Another major handicap in our circumstances, I feel, is the question of quality discipline. The overall quality of supplies from most of the vendors is yet not of a generally acceptable level by and large. This aspect should attract increasing attention of the buyers and by proper technical aid to the suppliers and continued insistence on raising the quality level, would pay dividends I feel."

Since we cannot avoid this uncertainty we shall have to see how best we can evaluate a vendor. As far as the evaluation of quality is concerned, I hope the following points will be useful in assessing the suitability (for new source of supply).

- Facilities* : Plant layout,
: Machineries and equipment,
: Quality control system,
: Storing and delivery system,
: Tool room facility,
: Flexibility in providing short lead time.
- Personnel* : Type of supervision by technical personnel,
: Skill of the operators,
: Technical competence of the supervisors and foremen,
: Morale of the operators,
: House keeping.
- Performance* : Vendor's service record,
: Confidential information from other sources where the vendor is having business.
- Samples* : Prospective suppliers' various product samples are to be thoroughly evaluated for judging the workmanship.

After analysing all the above points the buyer will be able to arrive at a sounder judgment on the vendor's capabilities in maintaining the quality standard.

3. *Geographical position.* The geographical position is an important consideration in evaluating the vendor. A vendor located at a great distance from the buyer's plant tends to create interruption in supplies due to accidents, strikes, floods, negligence, and so on. Moreover, the buyer cannot keep regular personal contact with the vendor if he is located far from his plant. Apart

from these factors, sometimes the buyer has to pay a little more towards transportation charges. But at the same time we cannot get all the materials near the plant. In India, different States are more or less monopolising/specialising in different products. Hence the buyer has to locate a suitable source even if it is far off from his plant. The risk involved is quite great but unfortunately the position is such that it just cannot be avoided. If we analyse the situations it will be observed that this single factor has contributed much to the stoppage of work or other types of inconvenience.

For example, two rolls of sensitised tracing cloth were despatched from Bombay to Calcutta through road transport. Though the materials were expected to reach Calcutta within 4/5 days, they actually arrived after 15 days. On investigation it was found that the lorry had a breakdown somewhere on the highway. Though these rolls were urgently required, the buyer had no alternative but to wait till the arrival of the material and for this 'waiting' the buyer's company had to pay heavily. The buyer had to place order for this particular type of sensitised tracing cloth on Bombay Party as none of the Calcutta Party could supply these. Though geographical location plays an important role in the selection of source of supply, sometimes the buyer for a number of reasons is not in a position to get the materials near the location of his plant and the buyer has to take risk of placing order at a place which is far off from his plant. This is a practical problem and wherever possible it is to be solved by applying rational judgment after analysing the following points:

Risk involved,

Coverage in his own production line,

What are the consequences of stockout,

Whether emergency action will solve the bottlenecks, if any,

Possibility of using substitute modes of transportation.

However, for all practical purposes efforts should always be made to *locate and develop the source of supply locally* to avoid future complications arising out of interrupted supplies, and supplies not conforming to specifications.

4. *Labour relations.* There is hardly any industrial organisation which can claim that it does not have labour trouble in it. 'Labour' is a very sensitive factor of production and the efficiency of any organisation is directly dependent on the labour relations.

The continuity of supply is definitely disturbed when there is labour trouble in the supplier's plant. Labour relations play an important role in the selection of the source, but often the helpless buyer has got no alternative but to place orders on a supplier who may be having or may have/had labour trouble. It is because the supplier has other important plus points. Labour trouble is so unpredictable that in our circumstances no one can help it in any way.

I know a case where the vendor was having a well-established modern machine shop and skilled operators, ideally suitable for any precision pressed or turned parts. The factory was running well, but all of a sudden due to inter-union rivalry the situation took such a bad turn that the owner had no alternative but to close down the factory.

In another instance, a moderately equipped printing press had been having cordial labour relations for the last 25 years, and there was no interruption of supplies from this press to different buyers. A particular buyer had been having business with this press for the last 10 years and the buyer was happy with their price, quality and delivery. One day, quite unexpectedly the owner of the press informed this buyer that his workers had intentionally 'slowed down' the production and the supplies would get delayed. On investigation it was found that the workers wanted more wages, and the higher wages were to be implemented immediately. Even two or three sittings for the settlement failed.

These are the most unpredictable and unexpected cases and very difficult to visualise in anticipation for assessing the labour relations in an organisation.

However, since assessment and selection have to be done, we shall have to see how best they can be done within the framework of existing situations. For this, one shall have to see the following points before the selection of a vendor. Though these points may not always prove helpful, they will surely help to make the assessment of the position/situation to form a fair idea about the vendor.

- Morale of the working force,
- Wage system of the working force,
- Labour policy of the supplier,
- Degree of responsibility of the leadership of the union associated with the plant,

- The history of past lockout, strikes, gheraos, etc.,
- Working conditions,
- Attitude of the management towards labour,
- Environment of the plant.

5. *Rigid sales contract.* Quite often a buyer comes across rigid sales contract of the vendors. Sometimes these are so rigid that it becomes really difficult for the buyer to comply with it.

In our country most of the large organisations including the public sector undertakings work under rigid and standardised code of practice. In terms of evaluating suppliers, a situation of this kind means that the buyer is faced with a limited choice or no choice at all. The selection of vendor in this case is a matter of judgment and the policy of the company. However an analysis of the situation has to be made to ascertain how better facilities can be obtained through negotiations and putting meaningful arguments before the vendors and sometimes this does pay dividends.

For example, during 1974 when there was a general increase in prices of various items, one large company increased the price of a component by 15 per cent. They intimated the buyer that the price increase was effective from the date of the letter (for all the supplies pending to be made). The buyer was not ready to pay the extra amount even for the backlog and he protested against it. The supplier did not agree to charge the buyer at the earlier price even for the backlog quantity. Finally, after a great deal of correspondence the supplier as a special case agreed to charge at old price for the backlog quantity. Here the negotiations paid the dividend. Similarly every buyer has to negotiate logically wherever the situation arises. Rigid or standardised rules cannot be applied all the time. After all no rule can claim validity if it is not properly applicable.

6. *Monopoly.* What alternative has a buyer got when the supply is from a monopoly source? The reply in one word is 'none.' Here, the buyer is at the complete mercy of the monopolistic supplier. No selection technique is applicable in this particular case except negotiation and persuasion.

7. *Size.* Quite often a buyer is faced with the alternative purchasing either from a large, a relatively small or a still smaller organisation. All the organisations have their own advantages and disadvantages.

The larger units have better facilities—such as qualified and skilled technical, personnel, R and D facilities, better storage and

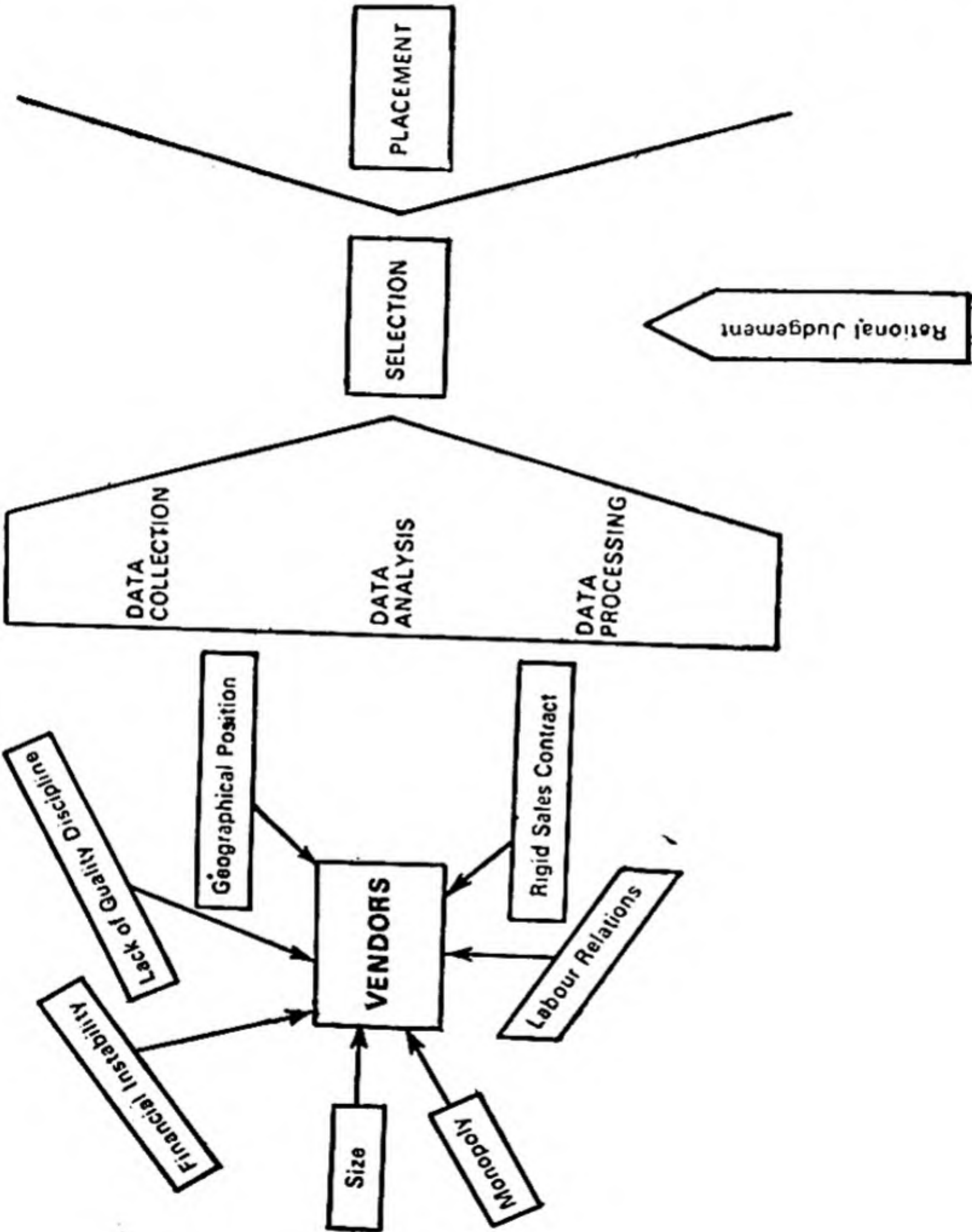


Fig. 1.

delivery facilities, and better processing facilities. The advantages of the smaller units are :

- (a) Cost of products is less,
- (b) More appreciative,
- (c) Will entertain special and unusual requests,
- (d) Will entertain small orders,
- (e) Will give prompt and logical hearing to customers' requirements and modification/rectification thereof,
- (f) Will carry out work as per customers' instructions, and
- (g) Will consider cancellation at short notice.

Although size alone is no assurance of correct and uninterrupted supply, yet the advantages and disadvantages should be taken into consideration before negotiation and the orders be placed thereafter.

Keeping all the above constraints before us, we shall have to go forward and select the right one amidst the various odds. This of course always calls for data collection, data analysis and data processing for the selection of the source of supply (Fig. 1). If our approach is one of hope and confidence and if we are willing to acknowledge and get adapted to changes, then we shall succeed.

The analysis I have made in this chapter may not be complete but I do hope that it may help the buyer to bring some sort of equilibrium which could be quite meaningful to him.

In recent years the increasing complexities in business have compelled the purchasing departments of various organisations to develop new techniques and cultivate the knowledge conducive to the complexities. One thing is certain that the range of complexities will go on increasing, but we shall have to make greater efforts to overcome these complexities. We shall have to move with the situation accurately so that we are not displaced.

The time to take action for this is *NOW*.

VENDOR DEVELOPMENT*

Industries have spent a great deal of money on research into materials and processes but few have done so on research into industry's most important asset—its vendors. As complexities are growing, we have to find out ways and means to get the right material at right price—otherwise we shall not be able to face the competition. In this age of competition only the best will survive.

As thousands of small vendors are supplying materials to various industries it is highly essential that they are developed properly so that they could deliver the components as per the desired specifications/requirements. If an analysis is made, it will be seen that most of the vendors are suffering due to :

1. Lack of finance,
2. Lack of supervision,
3. Inadequate process or equipment,
4. Inadequate or confusing or complicated design data,
5. Raw material trouble.

If one desires to achieve the best result, and if an organisation is 'vendor oriented', it will have to help the vendors in getting rid of their troubles. We should not forget that as these vendors are dependent on big industries, the big industries depend on these vendors. Each one has to help the other, and much attention will have to be paid to 'vendor problems'.

This is the area where the purchase department can offer a great deal. The gradual awakening to the facts of economic life is now beginning to assert itself in various directions—people in their respective fields will now have to play a better role. Previously the process of vendor development did not attract the

* Adapted from the author's article entitled "Vendor Development Under Varying Stress and Strain" published in *The Economic Times*, Bombay/New Delhi, 24th November, 1975 and 25th November, 1975.

attention of the industry but now, the bigger industry has fully realised that if they really want to improve the quality of their products at minimum cost, they shall have to pay much attention to this angle. This is not going to happen overnight, but its significance has been recognised.

Selection and Development

Vendor selection is a very tricky job. The wrong selection of vendors is sure to have disastrous effects. Hence, before the selection of the vendor is made, one has to see that the (1) vendor knows his job; (2) he has got at least minimum equipment and measuring tools; and lastly (3) he is more or less sound with his finance. Of course, it is very difficult to get vendors with the above three qualities, but if he has got the first one, the others can be helped out.

Let us again take the case of the panel sealed rotary type switch. This item used to be imported earlier. The lead time which the management gave was only 13 months as the production of the main equipment was to start in the 17th month. After having visited a number of small-scale units the materials manager was able to spot out a unit, the owner of which was having (1) and (2) of the above qualities but lacking in (3), *i.e.*, finance. The materials manager impressed upon his management that if financial assistance (in the form of advance) was given to the party, it could be possible to develop the switch as per the price indication given by the costing department. The management agreed to the proposal. Necessary financial assistance was given to the party. The party had to make 25 press tools for the switch. At every stage some persons from the design department, inspection department and purchase department kept visiting the party. In case of any problem the design engineer cleared it immediately or within the shortest possible time. In total there were at least 60 visits to the party's premises. Finally, the first sample rolled out in the 11th month. Since it required rectification, a few tools had to be modified to meet the functional requirements. After submission of the 4th sample the switch was finally accepted and green signal for bulk production was given. Although the supplies were delayed by one month, yet since the switches were found of straightaway acceptable quality, the production of main unit in the 17th month could be started as per planning. It was possible as the owner of the unit was a man of high integrity and the management of the purchasing unit always gave sympathetic consideration to the vendor's problems.

If the vendors are sympathetically handled, in my opinion, we can get a lot of things done by them.

In another instance a small vendor came to a purchase officer and complained that he was not getting 'A' type of raw materials. He also complained that the original manufacturer in Poona was not replying to him in spite of his several reminders. Immediately the purchase officer wrote a letter to the original manufacturer requesting him to supply the material to the above vendor, as otherwise it would be difficult for them to supply components to them. Simultaneously a letter was also sent to the Poona Office of the purchase officer requesting him to contact the manufacturer. As the original manufacturer was having problem in production, he was not in a position to supply the materials. However, due to the persuasion of the Poona Office and realising the necessity, the manufacturer took some extraordinary steps and sent a part of the requirements within the shortest possible time. This helped the vendor to keep his commitments, and also saved the ultimate production stoppage at the purchase officer's factory. The balance was of course sent after some time. This timely help made the vendor feel that he was really cared for.

In another instance, there was a sudden stoppage of supply of special socket type screws from a renowned supplier. It being a special type of screw and the quantity required very small, the materials manager was baffled and didn't know what was to be done. However, without losing much time the materials manager contacted the small parties who used to fabricate and supply screws to him. None of the parties was able to make the screw. Their main problem was the 'socket head' and 'heat treatment' to the desired specifications. The materials manager then divided the operations into the following way :

The screw maker was asked to do the threaded portion (Fig. 1), and another party who used to do the press job for him was entrusted with the punching of the head into the desired size, and heat treatment (Fig. 2). The help of the inspection department was necessary every now and then. Since the inspection department was not under the materials manager, he had to make requests to them every now and then. But the way the materials manager realised the urgency and the urge for developing the special type of screw, the inspection department being a separate department, could not realise the same. However, the first sample ultimately came out within 20 days after going

through different processes. After submitting a few more samples it was ultimately accepted and the instruction for bulk production was given in collaboration.

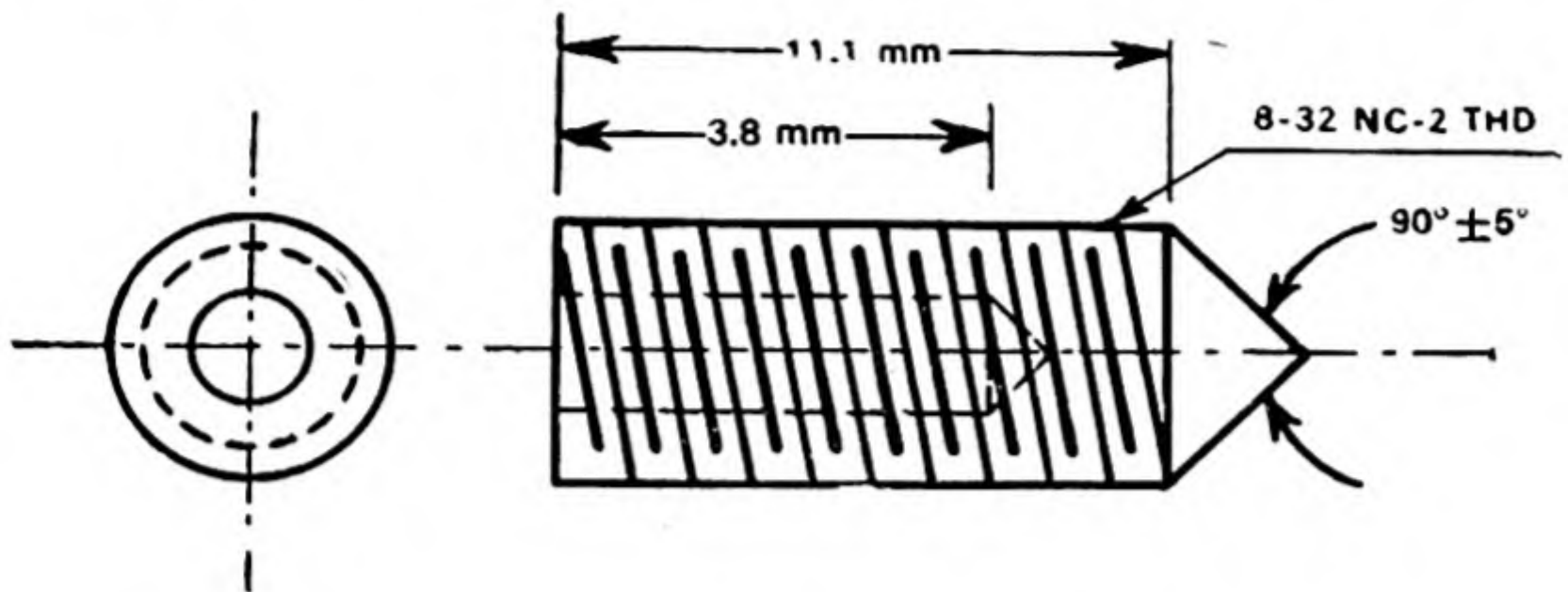


Fig. 1.

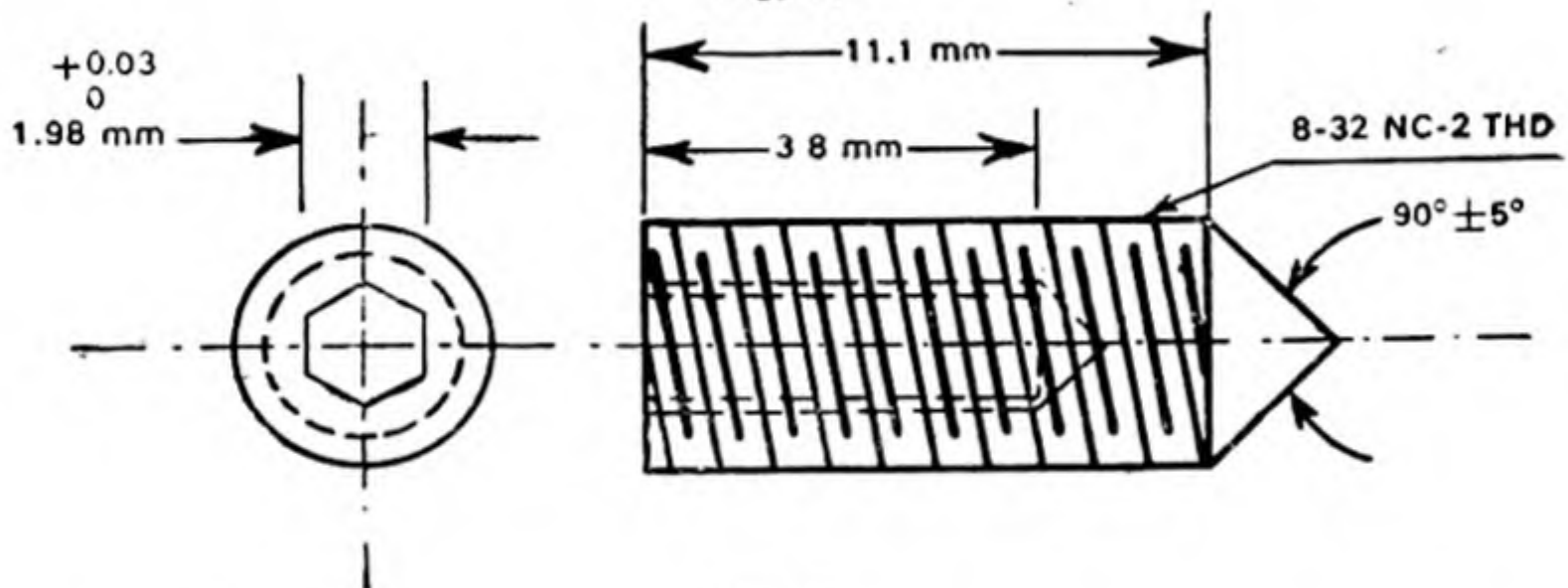


Fig. 2.

In this case, the money involved was not at all attractive to the suppliers. But, it was their co-operation which helped the materials manager to get the product manufactured. Hence, "co-operation" is one of the main features in developing the vendors. Each one has to co-operate with others in such a way that work does not suffer and concrete things come out of it.

To help and develop the vendors it will be better if a small Task Force is created in the big organisations with the members of the following departments :

Materials Management.

(Persons from Purchase Dept. and Inspection Dept.)

Development Department/Design Department.

Finance Department.

The team has to impress upon the vendors that "we are with you—go ahead" and it will be the duty of the Task Force

to make the vendors understand the famous Hegelian philosophy "Survival of the best".

Quality Culture

The factory manager of a large industrial organisation once commented, "The quality of the bought out items, in our circumstances, is an area which needs more definite attention. With most of our suppliers there is a lack of, what I may call, quality culture. It will be the responsibility of the purchase department to select and bring up vendors with the desired quality level."

It is my personal feeling that this field has so long remained uncared for. There must be a systematic and realistic approach to this important aspect of industrial buying activities. It is the duty of the materials manager to make the vendors quality conscious. A materials manager with resources available to him (as discussed under Organisation) can surely play an important role in this regard. To start with, it will be the duty of the materials manager to split up incoming inspection as per the organisational structure depicted in Fig. 3.

The inspectors of the 'Vendors Quality Assurance Section' should be asked to work with vendors to develop controls which would enable the vendors to deliver parts that needed no further inspection (or minor inspection) at the receiving end. This

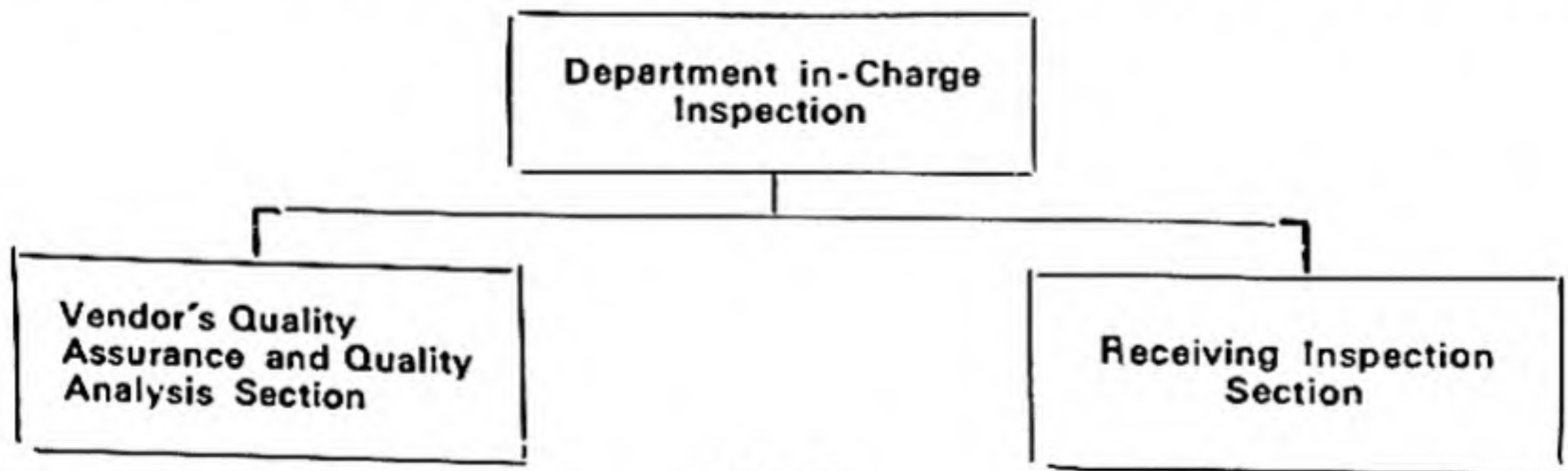


Fig. 3.

assignments naturally will increase both the responsibility and accountability of the inspectors, all of whom had previously worked as receiving inspectors. This responsibility and accountability will make the inspectors see that the vendors really understand what the management of the inspectors want. In turn this will have the following effects :

- (a) Improvement in the acceptance rate of purchased production parts.

- (b) An increase in the total number of suppliers capable of supplying certified parts requiring no further inspection (or only a minor inspection).
- (c) Reduction in inspection time.
- (d) Reduction in defective quality lots in production line.
- (e) Drastic reduction in the time needed to inspect purchased parts.
- (f) A visible increase in the technical competence of both manufacturing and quality personnel could be found.

Above actions, if implemented, will be just the beginning of scratching the surface in unleashing the total potentiality. The materials manager should be in the forefront, conducting studies designed to determine the best possible means of achieving the goal, *i.e.*, 'Quality'.

It is absolutely essential that there is a close association and co-operation between the supplier and purchaser for a higher state of perfection. C.H. Walter, of Marks and Spencer Ltd., U.K., wrote in his article *Materials*, "We co-operate with our suppliers, using the experience we have gained in our business, to foster good human relations. Personnel advisers advising on recruitment, labour turnover, absenteeism, methods of communications and training; advising on working hours, the special problems of worker in industry, encouraging creches for working mothers and all the detailed problems of personnel work. A doctor with special interest in health and safety, particularly with the new act imminent, ensuring medical rooms are properly equipped, nursing staff are available, looking problems of noise, solvent levels and encouraging cervical cytology screenings. An architect, advising on flooring finishes, and working environment. Also involved in problems of energy conservation and fire hazards. Lastly but by no means the least, our catering advisers, a well-received service which advises on catering, menus, kitchen and dining room layouts." This is what can definitely be called association and co-operation. In our circumstances I humbly hope that much more efforts could be directed to take proper care of this aspect.

The increased volume of social control, the extension of tighter control on money and the increased inflationary effects on the systems have made the situation really grave. The need of the time is concentrated efforts to increase efficiency and thereby productivity. Whatever resources we have got at our disposal must be deployed properly in every field of action including vendor development.

RESEARCH ON PURCHASING*

To maintain a steady progress in industrial activities everyone in his own sphere of activity will have to take pains and understand that with the expansion of the business the number of problems also increases. Accordingly everyone should arm himself to face the coming situation, so that he doesn't feel disarrayed when actually confronted with the problem. If we can see that the underlying possibilities within the economy are good then the prospects to tackle the situation will also be enhanced. This is the quality which is going to be needed *now* more than ever. Research is the answer to all these calls—continuous research in all the spheres of industrial activities.

To explore the potentialities of the economy, we shall have to make a unified approach towards research work. Only through research work we shall be able to know in advance, what would be the practical situation in coming years and also keep abreast of the probable solutions.

So far there has not been any concrete approach in our country towards research on purchasing activities. In my opinion such a research is very vital as much of the company's efficiency is dependent on its purchasing activities. How improvement in this sphere of activity can be effected is an important question. The only reply to this is in two words: 'through research'. This chapter is examining the necessity and areas of research in purchasing activities.

Why Research

Management's interest in research on purchasing has been on the ascendancy. Practically all over the world (specially in the developed countries) a sizable amount of money is being spent on research work on purchasing, so as to keep their organisations efficient and effective. Professors Westing, Fine and

* Adapted from the author's article entitled "Research on Purchasing" published in *The Financial Express*, Bombay/New Delhi, 14th June 1976.

Zenz in their work *Purchasing Management* write, "In recent years the increasing pace of business technology has necessitated that purchasing departments develop new techniques and cultivate an atmosphere conducive to the development of new and improved methods of operation. Research is basic to this process of adaptation. Hence, research is the process of applying various techniques and scientific principles for the purpose of defining a device, a process or a system in sufficient details to permit the realisation of its objectives."¹

The objectives are nothing but to attain higher efficiency through scientific utilisation of the resources and to increase the capability of the department for solving the future problems.

Organisation

Research should be a *definite* responsibility of a purchase officer—not *supplementary*, as supplementary responsibility, *i.e.*, assignment of responsibility to a staff doing normal purchase work tends to reduce the effectiveness of research. On the other hand, if it is assigned to a specialised staff responsible only for research work, the whole time concentration will definitely help to bring fruitful results.

Since organisational pattern varies from company to company, it is up to the individual organisations as to where they should fit in their Research Division. In any case, this division shall have to be headed by a dynamic person with analytical aptitude. With proper assignment of responsibility and authority, a significant improvement can be achieved—provided the recommendations made by him do not go unheeded.

While discussing organisational structure, I would like to pinpoint that the non-harmonious deployment of purchasing staff not only upsets the organisational set-up but this single factor also contributes much to the organisational inefficiency. "The efficiency of the buying department in many cases depends on the manner in which the buying department itself uses its staff. If it concentrates, for instance, only on 'buying the materials' it may mean achieving practical results, but the possibilities of 'scientific upgrading' become comparatively insignificant.

The total effort is lacking in measures for its introduction and follow up during the actual operation. A harmonious deployment of the buying staff, not only for 'buying the material', but also for investigation and information, for introduction and check up and for the development work is likely to yield finally quantitatively

larger accountable results and make the buying department more efficient." Hence the materials manager should take all possible care to see that there is a harmonious deployment of the people working in purchase department.

Areas of Research

To start with, the following five Macro Areas are listed :

1. Cost Saving.
2. Communication.
3. Personnel Development.
4. Economic Buying.
5. Vendor Development.

From the Macro Areas one has to go to details in Micro Areas. Possible Micro Areas are detailed here below :

Cost saving :

- Controlling non-productive labour.
- Value analysis or value engineering.
- Opportunities for mechanisation.
- Diffusion of activities.
- Quality and reliability control.
- Suggestion schemes.
- Forms and procedure.
- Variable factor programming (VFP).
- Analysis of operating cost.
- Scrap minimisation.
- Ordering system and procedures.
- Techniques which have their ultimate objective reducing input resources necessary for a prescribed output.

Communication :

- Reliability of communication system.
- Inter-departmental.
- Inter-factory.
- Intra-factory.
- Buyer-supplier.
- Meeting.
- Reports.
- Seminars.
- Write up.

Personnel development :

- Job analysis.
- Job rotation.
- Job classification.
- Job enlargement.
- Job enrichment.
- Developing more effective team.
- Education and training.
- Purchasing workshop.

Economic buying :

- Forward buying.
- Short-range buying.
- Selection and systematic buying of materials.
- Economic ordering quantity (EOQ)
- Make-or-buy decision.
- Speculative buying.
- Long-range ordering with staggered delivery schedule.
- Short-range ordering.
- Combination ordering.
- Risk analysis (Excess buying or less buying).

Vendor development :

- Vendor location.
- Vendor evaluation.
- Quality culture.
- Analysis of small-scale industries.
- Technical assistance.
- Financial assistance.
- Managerial assistance.
- Effective feedback information system.

The area of research as applied to purchasing techniques is a vast one. I think that the primary aim of these aspects is to summarise the present knowledge for achieving maximum benefit. Besides the disciplines I have mentioned there may be a few of them more which can be discovered with experience in operation.

The fast movement of technology has brought with it not only the technical problems but also economic problems.

"Problems created by new circumstances have to be solved, difficulties overcome, personal relations developed, experiments undertaken, temper controlled (not always easy!), hard and imaginative thinking done, and persistent and consistent efforts made. It is not enough merely to climb over these obstacles; the climbing has to be better and quicker than 'good enough'." Problems are there and will persist but he who will be able to visualise the problem well in advance and keep a solution ready, will be the most successful man at its arrival—as he is already armed with the solution. And this position can be attained only through 'Research'.

A few areas where research work can be carried on have been touched upon on the basis of many years of personal experience and analysis. The way technology is moving, the research work has to be taken in hand right now and the results communicated to all concerned through publication so that everyone could take the benefit of the research work at various levels. This is necessary and will remain necessary for the integrated development of purchasing techniques so that the resources at our disposal could be utilised in a better way.

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Part Three
Related Activities

SCRAP MINIMISATION*

According to the available statistics, nearly five to ten per cent of the total raw material input is sold as scrap, and some portion completely thrown off. This huge wastage can be reduced if careful watch is kept from the stage the material is ordered to the despatch of finished items.

The three most important factors to be taken into account are :

1. *Study* : What we have got and how it could be efficiently utilised; and how to reduce wastage, *i.e.*, more efficient scrap recovery.
2. *Facts necessary* : What work is done and by whom; personal qualities of the person; theoretical and practical aspects of organisational efficiency; how the application is done, and how the work is supervised.
3. *Source of facts* : Organisational chart, merit-rating, job knowledge survey, effectiveness survey, source of supply, storage of raw and finished materials, principles of organisation and planning (production and material).

What counts most is a constructive approach of the management which should make the workmen understand that a high percentage of scrap means ultimate loss to the company, and that loss to the company, in turn, means less security of job to them. Each one of them, besides the foreman of the workshop, including the stores, purchase and production control departments should strive equally hard to increase efficiency in material utilisation. The

* Adapted from the author's article entitled "Suggestions to Minimis Scrap" published in *Productivity*, New Delhi, July-September 1964.

roles which are to be played by various departments in minimising scrap are indicated below :

Production Department. Once the ideal material has been obtained, it must be used systematically. Tools should be used exactly as per the specifications and there should be no deviation at all. There should be a tighter supervision on 'short cuts'. Though these shortcuts may boost up production for the time being, yet the company has to face the loss of material in the long run.

Stores Department. All incoming materials should be properly checked before taking them into stock. If necessary, 100 per cent checking should be carried out, as non-standard and below-standard materials not only increase the unwanted scrap, but also cause serious upsets during production. Besides, bad storage and inadequate protection of the raw materials, or even the finished product waiting in transit, cause heavy wastage. Protection from dust, rust and deterioration from climatic conditions is highly essential. There should be adequate safeguards against bad packing which is another source of waste. How negligence and lack of farsightedness of the stores officer of a company led to enormous waste can be seen from the example cited below :

Company A placed an order for 3,00,000 pieces of cans on Company B, with delivery schedule as under :

March 30,000 pieces, April 30,000 pieces, May 50,000 pieces, June 50,000 pieces, August 50,000 pieces, October 20,000 pieces and the balance by December.

Before placing the order, Company A took all factors regarding production and storage capacity, etc., but to its surprise, Company B, at the end of May, supplied over 2,00,000 cans. Unwanted pressing of the purchase department on the stores department resulted in this situation, and to oblige the former, the latter accepted the material which was ahead of schedule. Owing to the shortage of storage capacity, the stores department dumped the material in a corner without proper protection. After some time it was observed that about 50,000 cans had become rusty, and they were so weather-beaten that over 60 per cent of them had to be treated as scrap, while the rest were sent for re-electroplating. A stores officer should regularly inspect the materials, find out how far they are protected against climatic conditions, and keep the management posted about deviations, if any, in supply or receipts.

Another matter which deserves notice is that excessive handling is always harmful. If the factory layout is poor and there is excessive handling, the risk of a product being dropped, trodden on, banged, or broken is multiplied. Therefore, care should be taken for proper layout of the factory to ensure minimum handling of materials. There is little use finding fault with raw material in the final inspection stage.

Production Control Department. Being the nerve centre of an industry, greater responsibility devolves on the production control department which should ensure unified planning to help the industry concerned to reach its production targets efficiently and economically.

Tight material planning is essential, and three aspects to be noted in this connection are :

1. The material planner should take proper rejection percentage. Accumulation of portions not utilised during production causes waste. Hence the need to arrive at the proper rejection percentage even while planning for some material.
2. The material planner should consider the various surplus items while planning, and ensure better co-ordination in the work of the concerned departments.
3. The material planner should be accurate and vigilant about the quantity he will be indenting on either the purchase department or overseas supplier.

Below is an example to show how a big industrial organisation had to bear a heavy loss. While planning for 1 mm. thick aluminium foil, the planner by mistake put an extra zero against 20,000 kg. In other words, against the actual requirement of 20,000 kg., he placed an order for 2,00,000 kg. The mistake was, however, detected only when the full quantity was received.

Purchase Department. An efficient, honest, and sincere purchase officer, with a dynamic outlook, is an asset to a company. He can help the organisation in various ways in its plan of scrap minimisation. A proper co-ordination between planning and purchase departments is essential.

On no account should a purchase department unnecessarily stress on management or other departments to relax the rules laid down regarding quality of material, etc., while accepting the material. It should be well informed about the social and political movements of the country, and guard against unnecessary stocking

of essential goods, as sometimes, some of the materials may not be used at all owing to technical changes and other factors. A good purchase officer should not be reluctant to negotiate with the supplier about changes in delivery schedules, or in cancelling orders, which may become necessary owing to changes in planning, though this should, however, be kept to the minimum.

Design Department and Development Department. These two departments have the responsibility of supplying correct specifications and design backed by accurate drawings. How a drawing with wrong specifications can cause loss to a company is shown in the following instance. A drawing for a small spindle was supplied by the design department, which, by mistake, mentioned its diameter as 2 mm. instead of 2.5 mm. On the basis of the drawing, the planning department placed an order for 2,00,000 spindles. These were duly received by the stores department, and passed by the inspection department also. The fault was detected when the material was sent to the fitting department. To avoid the production loss, and at the same time the material loss, which such a case would have entailed, the designs should be properly checked by at least two engineers before they leave the design department.

Equipment for Laboratories. Laboratories should be properly equipped and staffed, and in no event should an electronic engineer be concerned with chemical analysis, or a mechanical engineer with chemicals. Once an electronic engineer was asked to suggest a chemical for use in place of another chemical, the import of which the Government did not allow. After a few so-called experiments, he suggested a chemical which was eventually accepted by everyone concerned, and an order was placed for supply of 4,000 kg. But when it was sent to the concerned section for use, it was found that the chemical chosen was a wrong one. Such cases should always be referred to consulting firms which will be able to give proper guidance.

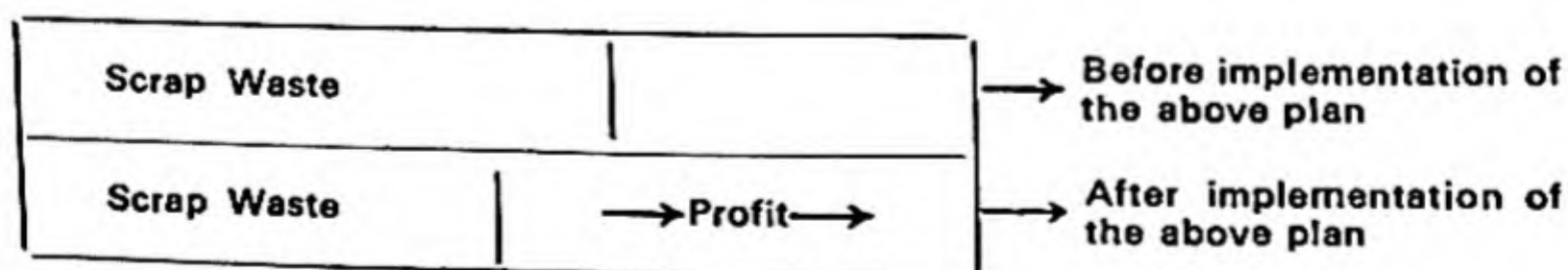
The design department should always keep in touch with the production control department regarding surplus stock of various materials. Whenever a design is evolved, efforts should be made to utilise the excess stock, if possible. This can definitely help minimisation of waste.

There are also other ways of scrap minimisation, *e.g.*, education of workmen by planned methods. The best way to inspire them to avoid or reduce waste is by teaching them

through artistically designed posters which have a psychological effect on them and make them understand the problem quickly.

But to cut the cost of direct scrap or waste, the formation of bonus schemes based on output and material utilisation will be a step in the right direction. The work study man can help in the matter by carrying out a cost analysis which could determine the scale of 'measuring the waste'. If this plan is implemented, the organisation concerned will be benefited to some extent.

It will also be worthwhile to have in big organisations a scrap minimisation committee, consisting of various departmental heads, and with the factory manager as chairman. It will be the duty of the committee to help educate the production personnel to appreciate that they should never use new raw material or components when recovered items are available. There should also be a full-time scrap minimisation engineer whose prime duty should be on-the-spot study of various operation cycles, and co-ordination of the work of the various departments in a systematic way. One may ask what is the use of a full-time engineer for this work. The committee can depute one of the existing engineers for this work, but this will not be much helpful. While a full-time specialised engineer will solely concern himself with the utilisation of waste and minimisation of scrap, any other individual, if put on a part-time basis, will not strain himself to see that the utmost is done to achieve reduction in waste.



To prove the above, a simple example is given below : Suppose, the total raw material input of an organisation comes to Rs. 50,00,000 annually. Now, if we take 10 per cent as scrap and waste, then it comes to Rs. 5,00,000. Of course, of this 10 per cent some portion is realised through scrap sale, which

will be also dealt with. To be more practical let us have it thus :

<i>Before</i>		<i>After</i>	
	<i>Rs.</i>		<i>Rs.</i>
(a) Total annual input of raw material	50,00,000	(a) Total annual input of raw material	50,00,000
(b) Scrap and waste (say, 10%)	5,00,000	(b) Scrap and waste (6%)	3,00,000
(c) Realisation through scrap sale (say, 20%)	1,00,000	(c) Realisation through scrap sale (say, 20%)	60,000
Hence total loss through scrap and waste ($b - c$) =	4,00,000		
		(d) Salary of SM Engineer, @ Rs. 600 p.m. and other facilities comes annually to	9,000
		(e) Other miscellaneous expense	4,000
		Hence loss ($b + d + e - c$)	2,53,000

Hence, after the implementation of the plan the company will be a gainer by Rs. 1,47,000 (Rs. 4,00,000—Rs. 2,53,000).

Finally, it should be noted that there cannot be a permanent 'one best way'—the best way will differ from year to year. Also, scientific approach can help to increase efficiency, which is the fundamental basis of all types of industrial activities. This is also one of the most straight and sure roads through which it can be hoped that the industries can reach the goal, *i.e.*, 'Progress'.

MANAGEMENT OF SCRAP, SURPLUS AND OBSOLETE MATERIALS*

During the last few years, there has been an increase of scrap, surplus and obsolete materials in industry—and with rapid industrialisation it is growing rapidly both in volume and approach. Since the days of industrial revolution, scrap and obsolete materials have been posing problems to the management. In America estimates of the gross sales value of waste material transaction of all kinds range around four billion dollars annually.¹ The task of managing scrap, surplus and obsolete materials in an efficient way with the idea of minimising its quantity while maximising the efficiency in disposing of these materials is really very complicated. Especially, in a large organisation, it is necessary to look at these problems in a very wide context, as much of the company's efficiency is dependent on it. In the previous Chapter, I have dealt with scrap minimisation as a separate issue and made certain suggestions exclusively for scrap minimisation. But scrap minimisation and disposal of scrap/waste materials are branches of the same tree, and hence, in this Chapter, I have combined these two aspects in a single bunch and sought the best manipulation of the problem under a single management.

Organisation

In almost all organisations, whether big or medium or small, the disposal of scrap, surplus and obsolete materials lies with the purchase department. This department, being specialised in market conditions, is in a better position to assess the market value of the waste materials. But unfortunately, it is not in a position to suggest how the scrap can be minimised, whether scrap materials can be reused in the plant, whether these obsolete/surplus materials are really obsolete or surplus, and so on. All

* This paper was presented by the author in the 19th Annual Conference and Convention of Indian Institution of Industrial Engineering on 12th February 1977 in Calcutta.

these now call for a specialised department in every industry, whose specific duty and obligations will be to minimise scrap and to see how best the scrap and surplus and obsolete materials can be managed to achieve effectiveness. It is easy to say all this, but it requires constant observation to achieve it practically. However much we may improve the techniques which we use and the standard of those that practise them in the long run, their effectiveness is going to rest very largely on the attitude towards their application.

For a relatively small and medium industry a full-time department dealing with relative problems may not be necessary if the duty is allotted only to a specific engineer of the organisation who has got necessary expertise. But for large organisations, a full-fledged department is absolutely necessary for analysing all the aspects of the process. The man who will head such a department should have some, if not all, of the following basic attributes of dynamic nature :

He must have a logical and analytical mind.

He must be able to pin-point the success or failure of the methods in achieving the aims.

He must be able to locate the areas which can be further improved.

He must have knowledge of market trends.

He must be creative/innovative.

He must expose himself to criticism/suggestions.

He must know what the organisation is manufacturing and the related process.

Such a man can work for, and by following the steps, which will be discussed afterwards, create considerable improvement in the utilisation of materials and thereby bring about considerable saving. Such a department may be designated as **WASTE MANAGEMENT DEPARTMENT**, the head of which should report to the Plant Manager directly.

Sources of Waste

In industry, in general, there are three distinctive sources of waste :

(1) Scrap ; (2) Surplus ; and (3) Obsolete.

(1) Scrap

An industry is a system where materials are consumed as well as generated. In this process both at the consumption and generation ends there are some residual materials left during processing. These may be procured materials or materials that come out during the process. Worn out equipment and parts thereof also come under this category. Since scrap cannot be avoided in processing, is it not worthwhile to see how these can be minimised. The persons employed in the W.M. department have to scrutinise all the working process and the correct feeding of materials. It has been observed that incorrect sizes of the input materials increase the volume of waste. An endeavour should always be made to feed the material of correct size constantly keeping a watchful eye on proportion and utility.

Further, an operator's error is another source of scrap. Analysis has revealed that in most of the cases the following contribute much in that direction :

(1) Monotony/Frustration ; (2) Stress and strain ; (3) Ambiguity in drawings ; (4) Carelessness ; and (5) Spoilage.

It should be the duty of the W.M. department to pin-point the defects to the concerned departmental head who in turn should try to ease out the situation as far as practicable. In this process, all the members should take unified steps and all should be willing to understand their position. Here again it is no use propagating beautiful words on scrap-minimisation if the basic structure of the organisation is not oriented to action and support.

Disposal of Scrap. When the scraps are accumulated these are to be segregated properly. In many organisations there is a system of having a scrap-yard and dumping all the materials in one place. Mixed up scraps fetch one type of value and segregated scraps another type. If the iron or steel scraps are mixed with brass or copper or aluminium, it is obvious that the buyer will offer the price of steel/iron scraps whereby the seller is likely to lose as copper, brass and aluminium have higher market value than iron or steel. The W.M. department should see that scrap materials are partitioned properly and they get the proper material value from the buyer. Before that, of course, they should have to be sure that these cannot be used in their own plant. One thing they should always keep in mind is that their scrap materials will be another man's raw materials—and adjustments have to be made accordingly.

(2) Surplus

The following are the main sources of surplus materials in an industry :

- (a) Wrong ordering ;
- (b) Technological changes ; and
- (c) Ineffective material control.

Many a time it has been observed that the above three factors have not only caused accumulation of surplus materials but also caused heavy financial loss to the units. Surplus due to wrong ordering and ineffective control of materials could be controlled to a great extent through extra efforts and skilful analysis, but it is very difficult to control surplus materials which are due to technological changes. In this time of rapid industrialisation and production innovations involving technological advancements, it is obvious that no one can escape this 'desired evil'. In the event of such a contingency, it will be the duty of the W.M. department to see how best the surplus materials could be utilised through efficient redistribution and reuse. For this the help of the design people will be needed to a great extent. Both the W.M. people and the design people should see that the surplus materials are reused to the maximum possible extent, as this will have significant bearing upon the profitability of the organisation they are working for. More so, due to various adverse conditions, material procurement becomes really a problem. So, will it not be better if maximum efforts are made to see how best the existing materials could be used ?

Disposal of Surplus. Here again sorting has to be done by type, alloy, grade, size and weight. After proper analysis, the W.M. department should try to locate suitable end users of exotic materials to get the greatest possible return. Then for the remaining items, arrangement has to be made to invite tenders, and negotiation has to be carried out so that maximum benefit could be gained. Under no circumstances should the surplus materials be jumbled up for that will bring definite loss to the company.

In multi-units there is a system of circulating the list of surplus materials. For some reason or other people do not pay much attention to these lists, or they just ask for the materials which are of immediate use but never think of the immediate future need. Hence, it should be the duty of the concerned people to scrutinise the list in a most systematic way, keeping in mind the company's interest.

(3) Obsolete

Here I am restricting my discussion only to materials. A finished product consists of many parts. Some of these parts, such as bolts, gears, springs, rubber grommets, etc., may be purchased as finished parts from other manufacturers.

The remaining parts are produced in the factory from raw materials. Each part must go through certain processes before finally assembled for a complete finished product. After the completion of a series, there are always some left over materials either in stores or in production departments. Further "obsolescence arises from the advance of the arts and cannot be predicted. A prudent management, however, operating in an art which is very active would set aside reserves from surplus in anticipation of this contingency."² When these surplus materials are not used further for some reasons or other, these become obsolete, *i.e.*, gone out of use. Statistics have shown that after the end of each series, there are at least 2 per cent to 3 per cent left-over materials. How to get the best return for these obsolete materials is really a big question. The company has already paid heavily on this account. Maybe the value of these materials has already been amortised on the whole series; but that does not mean that efforts are not to be made to get the best return on these materials. The W.M. department should consider all the materials of the factory as precious whether these are scrap, or surplus or obsolete, amortised or not. There should not be any leniency in the efforts.

Disposal of Obsolete Materials. The greatest value is obtained from the obsolete materials if these can be reclaimed for further use. Of course, this will cost extra incidental expenses for processing, but generally the savings are substantial. The W.M. department should scrutinise these points very carefully before disposing of these materials.

It should be kept in mind that obsolete materials sold as scrap will bring little return whereas if these could be returned to the original manufacturers (which may be standard items for them) much more return could be expected. For this, with the help of purchase department the W.M. department should try to negotiate with the original supplier.

All that I have discussed earlier will not work if the W.M. department does not get an all-round support of the management in their work. The economic characteristics of a business as a

whole lies on the efficient discharge of duties of all concerned and a pragmatic outlook of the management. Unless these are properly proportioned, the system will not work efficiently. Functionally, the business may be well run due to its quality and financial structure, but if the instruments on which it relies to guide its course are not up to the mark, its ultimate performance will be in danger. Hence it is up to the management to orient the structure of the W.M. department in harmony with the changing economic environment of the present problematic world.

Economics of W.M. Department

Prior to the establishment of a W.M. department, the management has to analyse the economic characteristics of such a department. A well-managed organisation operates on the basis of an expense budget based on anticipated return. Here, by return I mean total saving as well as money gained on yearly sale of waste materials. In this respect, the details which I am going to put may not, however, give a comprehensive picture of the whole range of the possible relationships of expenses to return, nor are they adapted to answering readily the many problems of policy which daily occur in operating a factory. It is just to give a structural idea of the probable expenses.

For example, let us assume that a factory with an annual turnover of Rs. 100 million intends to establish a Waste Management Department. Prior to financing such a department, the management has to investigate the yearly operating cost of such a department—details of which are depicted in Table 1.

If the annual purchase of the factory in question is Rs. 40 million and there is a 3 per cent total yearly waste (which comes to Rs. 12,00,000), and if by setting up the above department at an expense of Rs. 2,32,500 a return of at least Rs. 2,00,000 can be achieved *initially* through the techniques as mentioned, then in my opinion it is worthwhile setting it up.

The above illustration is no substitute for managerial ability, but it does provide the information that the executive needs for effective decision-making.

The orderly and efficient attainment of a goal is rarely achieved without considerable planning and analysis as to how the desired end can best be reached. In the field of Waste

Management, the following three conditions can clearly increase its effectiveness ;

1. By employing systematic analysis the rate of waste can be minimised.
2. By enforcing strict control and methodic approach substantial gain can be made out of waste materials sales.

TABLE 1

S. No.	Expenses by Category	Rupees	Explanation
1.	Salaries—6 persons (1 Engineer, 4 Technical Assistants, 1 Clerk-cum-Typist)	1,30,000	
2.	Welfare expenses, say @ Rs. 1,550 per person	9,300	
3.	Gratuity @ 5% person	3,300	
4.	Provident Fund @ 8.33%	6,400	
5.	State Insurance	1,000	
6.	Quota in		
	(a) Technical Management	20,000	
	(b) Personnel Department	6,000	
	(c) Accounts Department	5,000	
7.	Stationery	7,000	
8.	Travelling expenses	12,000	
9.	Motor Car Allowance	6,000	
10.	Postage, Telegram, Telephone, etc.	5,000	
11.	Conveyance	3,000	
12.	Books and Periodicals	2,000	
13.	General Expenses	3,000	
14.	Repair and Maintenance	1,000	
15.	Rent 39 M ² (Air-Conditioned @ Rs. 260/M ²)	10,000	
16.	Fixed Asset Depreciation	3,000	
	Total Expenses say :	2,32,500	

3. Since it will be the *direct* responsibility of a specialised department, the objectives can be achieved in a systematic way. As in supplementary responsibility, there is a tendency to concentrate on the primary responsibility which appears more urgent, there is a tendency of negligence towards the supplementary responsibility.

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Part Four
Quality Stratagem

QUALITY MANAGEMENT IN INDUSTRIES*

The fast growth of technology in all the fields of industrial activity has brought with it new challenges which are not only causing constant technological problems, but also problems related with economics. Technology has got direct and colossal impact on the economy. For a meaningful result people who have a direct dealing with technology shall have to share the major burden in solving the problems. People of today are more conscious about the money which they earn and spend. They now want to be sure that what they are buying is worth the money. Hence the industries now have to be sure that what they are producing are quality products. All over the world, practically every country is spending a sizable amount on quality engineering. But, yet, there is little integrated approach towards the quality management. Until and unless this activity is managed in an organised way, I am afraid the economics of having such an activity will not have the desired effect. Here I have tried to analyse the management structure for such an activity with an idea to fill up the gaps prevailing in modern industries.

Organisational Structure

In most of the organisations quality assurance is playing a vital part in the whole activity, as this department is solely responsible for the quality of the products which are rolled out from the factory. Many a time it has been observed that due to unorganised organisational set-up, haphazard approaches had been made to solve the problems related to quality—this not only forced the organisation to feel the pinch of extra money but also caused inefficiency in the operational system. Hence, for a factory whether big or medium or small, there must be an effective quality set-up. This set-up is directly dependent on the size and turnover of the

* Adapted from the author's article entitled "Quality Control in Industry" published in *The Economic Times*, Calcutta/New Delhi/Bombay, 16th December, 1975.

organisation. One should not forget that the organisational set-up of any activity has got direct bearing on the efficiency.

The most important discipline in quality assurance is patrol inspection. It has been observed that for some reason or other most of the organisations do not have any system of patrol inspection or on-the-shoulder inspection. A good number of defects can be detected by patrol inspection beforehand and action could be taken to avoid further damage. A patrol inspector is like a patrol policeman who exercises constant vigilance on the activities in a wide area, and wherever necessary takes corrective action to avert mishap.

In a factory where people are busy with activities and burdened with problems, it is essential that someone should be there to co-ordinate the work in a systematic and unified way so that the work is not stuck up at any point for one reason or the other. Quality assurance department has got to perform various actions in the field of industrial process. In case something is stuck up somewhere for quality decision, then the entire production process will be held up. That is why it is highly essential to have a mobile co-ordinator in the organisational set-up whose prime duty will be to rush to the point 'of hold-up' and get free from the bottleneck.

Data Feedback System

The most important thing in any quality management is the data feedback system on failures. This system has to be systematic and effective as otherwise no concrete results can be achieved. Further, the information has to be passed on to the nerve centre of the quality assurance and, in turn, to the design and development authorities for their corrective action. The action has to be quick and methodic.

"Feedback should not normally be restricted to the individual service or organisation, the laboratory or manufacturer. Manufacturers of component parts and equipment, as well as the agencies using the equipment, can all benefit by a feedback programme. For instance, engineers can learn much of what has happened in the past, one can learn what to avoid in the future."¹

Feedback is essentially a flow of information on the failures or defects or design complications right from the vendors, incoming inspection, production, patrol inspection, outgoing inspection, field service and static service to the quality assurance centre. Unfortunately in most of the cases it has been observed that there

is no proper feeding of information. Until and unless concerned people do realise the importance of data feedback system, it will be difficult for the industries to maintain quality standard to a high degree. Any gap in data feedback system may disturb the equilibrium of the entire system at any time. Already the production process and procurement of materials have become complex on account of the fast growth of technology. If all the branches and all the people in the industry do not take proper steps to keep pace with the growth and arm themselves with probable solutions it is sure that whatever technology or science is utilised will be 'all in waste'. The need of data feedback system in quality management has to be understood by the concerned people if they really want to improve the product efficiency and render failure free service to their customers.

Planning

"Planning is the exercise of intelligent anticipation in order to establish how an objective can be achieved, or a need fulfilled, in circumstances which are invariably restrictive..... Planning is necessary because resources are limited."² The scope of planning is unlimited. At every stage of operations, planning is an effective tool with any organisation for attaining desired objectives. Due to the rapid growth of technology, the organisations will from now onwards have to think far more ahead than at present. This is necessary and will remain a necessity. Planning just 1 to 2 years in advance will not be sufficient. They will now have to plan the activities for minimum 5 years to maximum 10 years in anticipation. This forward planning will help the organisations giving substantial scope to organise the work. Hence, quality assurance departments will have to plan both the present and future work keeping a close bearing on company's short-range and long-range plans. It has been observed that the planning aspect in quality management has not yet attracted much attention of the management, and this has resulted in conflicts between the highly complex technology and human reactions. In this process, man-power planning is the most important. Whether we like it or not, time is not far off when it will be difficult to get "man" coping with the fast technological developments. Further, along with the technological changes a social revolution is also taking place. The government has accepted the objective of full employment. Industry and commerce will have to continue the operations keeping in mind the above two aspects. It, therefore, calls for an increasing attention on long range man-power planning for keeping pace with the

rate of technological, organisational and social changes. Turning to more detailed analysis of man-power planning, if one wishes to attain the targets then he shall have to plan.

- (1) Labour force (both skilled and unskilled) to obtain more output.
- (2) The effectiveness of the existing labour force.
- (3) The need to acquire quickly new skills and the acceptance by labour force that they may have to change their jobs within their company.

It will be useful to have in mind the following set of principles for successful planning :

- “(1) The objective is clear.
- (2) The objective is feasible in terms of available resources (men, material and machines) and in the anticipated circumstances of achievement.

The definition of circumstances must state :

- (a) Tolerances of achievement.
- (b) The most important resource or factor.
- (c) The period between anticipation and achievement is as brief as possible.’³

Training

The process of any planning and its full development will take place only if the people concerned with its implementation have vision and confidence. It will, therefore, be necessary to formulate necessary planning for future training, also, to ensure that the concerned people not only keep themselves acquainted with technology, but also see their minds are attuned to accept numerous changes in the next five to ten years. There is no doubt that the coming years will have more rapid changes from the conventional process to the advanced and sophisticated process; to keep rhythm with that, proper action has to be taken quite in advance, so that when the changes take place people are in a position to accept them. At no time ‘readymade’ boys and girls can be recruited as technical colleges and universities can supply boys and girls only with theoretical knowledge of certain techniques. Only industry and commerce are in a position to give good practical training to these boys and girls. So, it is for the benefit of the company to give properly directed and co-ordinated

training in the organisation. Quality assurance manager has to see that his present people are well trained for the intended job, and at the same time he will have to plan for the prospective training of his people basing on the future production of his company and related technology. This will help the manager to work with increased assurance that existing people or new people will remain reliable and will be so engaged that they will contribute to his department's efficiency. Almost all leading companies of the world are spending sizable amounts on training and education. For example, Siemens AG, West Germany,¹ spent around \$130 million during 1974 for inhouse training and education, an amount corresponding to roughly 4 per cent of the company's outlay for wages. In certain specialised fields, Siemens spends up to \$10,000 a person for training. Further, Siemens management education site is the \$8 million training centre at Feldafind near Munich. Here strictly Siemens-related management courses, including ways of raising productivity, are covered at a rate of between 10,000 and 12,000 participant-days per year.

The basic need of effective quality management in industries has to be realised by the management if they really want to improve the effectiveness of their individual organisation. In this chapter, I have discussed a few salient points related with effective quality management without going into details of its technological aspects. It is hoped that with the present spate of almost daily new-born techniques, some meaningful ways will be discovered to tackle the problems related with quality management by appraising the whole situation methodically.

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INDUSTRIAL INSPECTION*

Specialisation arises out of the needs of men. The wants of the community are many. Everybody cannot meet all his demands for lack of time and capacity. Hence there is an exchange of services based on specialisation of knowledge for the survival. Industrial inspection is one of the disciplines of the specialisation. The people who work in this department are specialists—as they have developed a special knowledge in that sphere. These are the people who are responsible for the ultimate quality of the products which their company manufactures. In these days of competition and economic stagnation, only those who are able to give quality products will survive and those who are not meet their natural death. Realising this fact, the managements of the modern industries are putting much stress on 'quality'. The production manager of a leading manufacturing organisation once commented: "It is better to produce small number of quality products than to produce a large number of substandard products." All of us must have observed that in recent years enormous research works have been carried out on industrial inspection for developing systems by which control could be tightened for obtaining better results.

Organisation

The study of organisation has a long history. The increasing size of complexity in industry brought about a systematic organisational set-up to control the activities assigned to various level of employees. At present, right from the top man down to the lowest category of employees come under a definite organisational pattern. In general we can categorise industrial inspection in the following ways:

Incoming Inspection
Process Inspection

Patrol Inspection
Final Inspection

* Adapted from the author's article entitled "Industrial Inspection Under Varying Stress and Strain" published in *Indian Management*, New Delhi, May 1976.

Each of these sections is headed by a chief inspector and in turn these chief inspectors report to the quality control manager. Regarding incoming inspection I have got a few comments to offer. In some organisations incoming inspection department is tagged up with production department ; somewhere it is exclusively an independent unit. In my personal opinion this activity should be tagged up with the materials management department. The reasons of my thinking have already been outlined in Chapter 2 of Part One.

Stress and Strain

(1) The main problem of today's industrial inspectors in our circumstances is to strike a balance between availability and quality. By availability I mean to say the available components made out of indigenous technology and indigenous raw materials. It is very difficult to get a continuous supply of raw materials on the basis of strict specifications. On the other hand, most of the vendors are not equipped properly with men and machine. So, products made out of all these combinations surely call for a heart searching whether one should accept or reject them. I have seen inspectors faced with this problem using considerable amount of judgment in accepting or rejecting the material as they have got before them two alternatives. One is to accept the material (after proper evaluation) and keep the production running, and other to reject the material and face the production stoppage. But, they have to see that they do not accept bad material and also that the production moves on.

(2) Another problem which the inspectors face is lack of proper measuring instruments—lack of environmental testing equipment, etc. It has been observed that in some cases people do not pay much attention to the above problem. Who knows that due to inaccurate measuring instruments/gadgets, good materials are being rejected or bad materials are being accepted! Under no circumstances old and worn-out instruments should be used, as this will increase error rates and may cause extensive damage by failing to identify the defective materials. If these defective materials are used in subsequent assembly operations, it may cause serious damage or even injuries to operators.

(3) It has been observed that there are constant disputes regarding failures and sub-standard material between the inspectors and the users or the purchasers. These end in unwanted happenings.

(4) "With advancement in our technological development have come notable improvements in the older type of materials, many discoveries of new materials and a variety of new uses for all materials. These have greatly extended the scope of materials testing and have complicated its practice."¹ The inspectors of today's industries are facing these complications. With the advancement of technology in our country, we have to see that proper pace is maintained amongst all branches of technology. If one branch grows faster than the other, then it will not be possible to overcome the complications. The growth rate must be balanced.

(5) The primary duty of the inspectors is to compare the conformity with the specifications. These specifications are their first-hand guidelines. It has been observed that ambiguity in specifications not only causes delay in inspection but also rejection of materials. In many industries I have observed inspectors running about seeking clarifications of the ambiguous specifications.

(6) Inspectors, even the best of them, are subject to being overruled. At any time one of their decisions may be reversed by someone having higher authority. Sometimes it may so happen that sheer production requirements or economics demand the acceptance of definitely below-standard work temporarily. It has been observed that human inconsistency, whims, snap decisions or some form of what might be called 'in-plant politics' too often play an important part in overriding the inspectors' decisions. So, the inspectors constantly work under 'fear' and also take 'guard' wherever possible. This way of working tells very badly on the process of inspection.

Having all these problems in the plate, the industrial inspectors of today are no doubt trying hard to overcome these difficulties in a unified way to keep the wheel of the industry moving. "In a sense, an inspector is constantly in a position to sabotage his company's profits. If he too constantly approves substandard work, then extra effort, motions, time and cost can build up at assembly or the inspector's carelessness may boomerang in the form of lost trade in the company's market from customer dissatisfaction over inferior merchandise.

On the other hand, he can build up unnecessary losses from being too strict and self righteous at his inspections. Always, somewhere in between is correct balance. No inspector probably

ever achieves it, but he can assuredly try constantly for perfect decisions."²

Importance of the Problem

In the area of industrial inspection where an inspector has to work at varying levels, the problems mentioned above can cause extensive damage to the whole industrial processing cycles. The management and particularly the designers will have to take greater share of responsibility to minimise problems. The need of the hour is to increase efficiency. But persons infested with problems cannot increase efficiency, however efficient they might be. That is not the all, the industrial management of today has to strike a balance between the traditional methods and new methods for visualisation of the situation as a whole, if they really want to improve the efficiency/productivity of their own plants.

"Human factors engineering, applied to the future design of quality control work stations and systems, should include behavioural engineering applied to the inspector's task. In ideal circumstances, such applications would provide a valuable link between the economic systems, objectives of management, and the personal rewards of being an inspector."³

In a nutshell, I believe that everyone has to realise the depth of the problems and approach has to be made to improve the working conditions/environments style/method through proper planning and co-ordination.

In this chapter I have just pointed out a few problems the industrial quality inspectors are likely to be confronted with. Hence, in these days of complexities, everyone has to be alert against the possible 'threats' to the industry. Everyone has to perform his duty properly in his own sphere. We cannot do away with the 'difficulties' but that does not mean that we should not try to overcome these difficulties. A newly born baby has a number of difficulties to face but when it begins to understand the thing, it tries to overcome them. In our circumstances, where we are faced with so many odds, it is only through our sustained efforts that we would be able to transform these odds to 'good'.

At present industry is fully dependent on 'quality'. The major responsibility for manufacturing quality products lies with the industrial inspectors. They are the people who can bring reputation to the organisation or a bad name. Since reputation is

preferred by the industry, industry has to see that the industrial inspectors are properly placed.

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CONTROLLING THE QUALITY OF PURCHASED MATERIALS*

Over the years, various techniques, such as Quality Control, Work Study, Operational Research, Value Analysis, etc., have been developed to provide management with effective tools which could assist them in work to reach the highest productivity. In this process extensive research work is being carried out as to how more improvement can be brought to the existing techniques so as to meet the demands of high rate of technological movement. We, in industry, have to be alert of the situation and all the aspects of the industrial developments have to be scrutinised carefully as any omission may cause disaster to the system.

Industry is a system where some materials are consumed to produce some other materials. It is utmost necessary that consumed materials are procured with maximum efficiency, and also used effectively for better results. The basic requirements of the situation are then to develop a philosophy which would assist the management to recognise the key areas. One of these is the quality of purchased materials and control thereof. There are many techniques prevailing in this area of operation but so far there has been little integrated approach in this line as to how these practices can be made of a high and uniform standard coupled with the acceptance of the need to make changes and improvements.

Role of Purchase Department

The people who are working in the purchase department first of all have to take the major burden of procuring the quality materials within a reasonable price. In the field of buying, quality plays a dominant part both in meaning and in application. Quality refers to the suitability of an item for its intended purpose. A supplier may be able to supply the desired quality as

* Adapted from the author's article entitled "Controlling the Quality of the Purchased Materials" published in *Productivity News*, New Delhi, April 1977.

per the schedule but the quality of supplies may not be as per the required specifications, *i.e.*, not suitable for the intended purpose. Until and unless the people of the purchase department realise this basic fact, no tangible result will come out. They have to select the source of supplies after proper evaluation, so that the standard is maintained all along as far as possible. They shall have to take initiative to make their suppliers quality conscious. Purchase department has to see that the desired quality of purchased material is in the material itself as and when they arrive and reasonable assurance of this can be had through careful attention to all responsibilities in the purchaser's organisation. But for this all control points are to be stimulated with the objective which otherwise will remain ineffective.

CONTROL POINTS

"Control, as an essential aspect of management, arises from the inherent imperfections of things and people, both within a particular plant and outside of it in the form of suppliers and customers." Today, the situation is such that everyone in his own part has to exert his maximum capacity and capabilities to overcome imperfections or to tighten the control points.

The incoming inspection alone does not ensure the quality of all incoming materials. As a matter of fact all the people responsible for handling materials by and large should pay attention to see that bad materials do not go into the final products. Control points can be grouped under two conceptions :

1. Active Control Points ; and
2. Passive Control Points

1. Active Control Points

(a) *Receiving Stores.* Much importance is not paid to this unit of an industrial organisation. In most of the organisations it does a "post office" type of work—just receive the material, raise goods' incoming notes, pass on the materials to inspection department and then send the accepted materials to the main stores and rejected materials to the supplier. But care, now, has to be taken to see that personnel working in the receiving stores at least visually inspect the incoming materials. This way the organisation can save a great amount of extra labour and money. But for this the department has to be reoriented. I know several cases where the vigilant attitude of the people working in the receipts made possible the early detection of major defects in the incoming stores.

For example, once one supplier brought 50,000 pieces of (zinc plated and chromate passivated) screws. On opening the boxes the storekeeper observed that most of the screws were rusty. Immediately he contacted the purchase department and the lot was returned right from the receiving site.

In another case 3,000 pieces of plain brass sheets 1.5 mm thick (30×30 cm) were delivered in the receipt department. Only one look at the stacked brass sheets created doubt in the mind of storekeeper. A few sheets stacked in between were having the thickness which was less than 1.5 mm. He immediately called an inspector and asked him to check a few of the suspected materials. These sheets were having the thickness which varied from .79 mm to 1.1 mm. He returned the materials from the receipts department itself and requested the agent of the supplier to deliver the materials after proper sorting.

We must see that control points are effective and all concerned take pains to understand the necessity of controlling the quality of the purchased materials.

(b) Incoming Inspection. Incoming inspection is the most important control point under this category. "Inspection is the art of critically examining parts in process, assembled, sub-systems or complete end-products with the aid of suitable standards and measuring devices which confirm or deny to the observer that the particular item under examination is within the specified limits of variability." With the advancement of our technological development complications in practice of industrial inspection have increased to a great extent. Hence, the industrial inspectors have to be always alert of the situation and make adjustments accordingly so that they can discharge their duties efficiently and effectively. Though it is difficult to assess the material suitability keeping bearing on production requirement, constant efforts are to be made not to accept substandard materials or to reject materials on simple grounds. In an industry incoming inspection is the main department which controls all the purchased materials. "The inspectors are monitors who see to it that incoming material is of the proper quality."

Regarding rejection of materials on simple ground, I give below an example. Once a lot of brass sockets was rejected with comments "dimension $2.5 \text{ mm} \pm 0.2 \text{ mm}$ measuring 2.85 mm ". The purchase officer on receipt of the rejection report requested the inspector to carry out the functional trial as he knew that this minor deviation would not affect in any way. The inspector

reluctantly carried out the functional trial in the assembly department, and fully accepted the materials after taking the opinion of the assembly foreman and satisfying himself finally accepted the materials. In industry, the problems related to acceptance and rejection on simple matters arise everyday. Through sustained efforts and pragmatic judgment one has to visualise things for eliminating doubts.

However, whatever techniques we may apply, errors are bound to occur and we cannot escape the ESCAPES. ('In industrial terminology 'Escapes' means 'failure of the inspector to identify defective materials'). This is the area where passive controls shall have to be properly regulated.

2. Passive Control Points

- (a) Main Stores
- (b) Production Departments
- (c) Design and Development Department

(a) *Main Stores.* Storage of materials plays an important role in the maintenance of quality of the purchased materials. It has been observed that many materials get rejected due to their deterioration because of bad storage. A vigilant and dynamic storekeeper can, through his sustained efforts, keep the quality of the stored materials always to an acceptable limit. In some organisations, it has been made obligatory on the part of the storekeeper to see that materials are well stored so that atmospheric hazards and bad physical storing do not in any way reflect on the quality of the materials—and this practice has to be followed in each and every industry. Further, if necessary, where storage of critical components is necessary for a long time due to some reasons or other, a small air-conditioned store must be provided.

I know a case where a storekeeper observed that some of his silver plated materials were getting tarnished (during the monsoon period) and knowing the effect of tarnishing (*i.e.*, poor solderability), he immediately brought the matter to the notice of the quality assurance manager. The quality assurance manager recommended him to store these in air-conditioned store (as these materials were critical so far solderability was concerned). Since there already existed an air-conditioned store, he arranged to keep these in it and saved them from further damage.

In another case a stores issuer, while issuing the materials, detected that two types of resistors were in a mixed-up condition.

This had not earlier been detected by incoming inspection as the inspection had been carried out on sample size. He brought the matter under the notice of the storekeeper who in turn asked the incoming inspection to check the resistors and sort them out as per specifications. In another instance a storekeeper detected that copper clad epoxy laminate boards were getting oxidised, he immediately after consultation with the development department arranged to get them coated with a solution of resin and alcohol.

The sole intention of citing the above simple examples is to show that the involvement of the stores personnel is extremely necessary in maintaining the quality requirements by avoiding natural and unnatural hazards. So, for this, the management of the industrial organisations has to orient their stores and stores personnel in the following way for an effective control on the quality of the purchased materials :

1. By assisting them in identifying key quality tasks within the stores.
2. By giving them proper training.
3. By helping them in checking that the space is adequate for effective internal transportation and storage of materials.
4. By assisting them in finding and overcoming bottlenecks which restrict operation.
5. By assisting them in spotting to what extent the techniques are likely to produce results.
6. By assisting them in creating a climate of gaining enthusiastic co-operation from all concerned at all levels.
7. And lastly, they should feel that they are part of the organisation and their involvement is necessary for the organisation.

(b) Production Departments. "This, then, was the start of Industrial Revolution approximately 200 years ago, which has progressed at an ever increasing rate since the days of James Watt and Richard Arkwright. With this progression, the industrial worker, unfortunately, was getting further away from the end-product. Rarely do the machine operators of today have the slightest conception of where or how the parts they are machining will fit into the end-product." This being true, the industrial management has created a special skill to examine the products in process to ensure that the processed product fits properly in the

end production. But all the time it is not possible for these process inspectors to detect the fault in each and every piece. The operators and production supervisors who are processing each and individual items, are definitely in a position to locate the fault in the individual item. For this, they shall have to be properly trained and motivated. This is an area where 'fear' element cannot work, whereas 'motivation' element can work effectively. The operators and supervisors are to be motivated to locate the fault (if any) during the process of production. They should feel and understand the complications of processing a substandard material. A man or woman's skill can be fully utilised only through the courtesy of a sensitive human being. The manager of the department must recognise and appreciate these traits in his subordinates. To cite an example, once a lady operator of an assembly shop reported to her supervisor that a few 10-pin rubber moulded sockets were having fine hair cracks in some of the pins, and if those were assembled, there would be the possibility of the enlargement of those cracks which would lower the reliability of the end-product. Immediately the supervisor brought the matter to the notice of the incoming inspection. Incoming inspection by applying temperature shocks and bump tests, asked them not to use these sockets. Then the inspection department checked the entire stock and found a few more substandard sockets. This was reported to the purchase department and finally returned to the supplier for free replacement with a request to check all the materials which were under production at his end. This timely detection of the fault was made possible, because the operators of that department were trained properly and the necessity of maintaining 'quality' was made known to them. Moreover, they were motivated by their manager to look after their company's interest, as the company in turn looked after their interest.

It should be the duty of the management to lay emphasis on why it must be done and how it is to be done in addition to what must be done by the operators.

(c) *Design and Development Department.* This department is the nerve centre of any industrial organisation. They are the people who develop products and design them for manufacture and prescribe standards and specifications. Final product specifications are prescribed by them with the limits of variability, which, if adhered to, will give satisfactory and reliable service of the product. The need for consistent quality of purchased materials led to the setting up of various controls at various

points. Hence, it will not be out of the way if the design and development department occasionally picks up materials from the production lines and checks them. In this process, a few hours may be lost by them but this will be worthwhile in the long run.

In this connection, I cite an interesting case where a development engineer, while passing through the production line, observed that one operator was much disturbed with a sub-assembly part. She was looking at the part and the calibrating meter in an unusual way. It seemed that she was not able to get the proper reading. The development engineer observed that and immediately picked up one of the sub-assemblies from the operator, and took the same to the laboratory. After one hour he requested the manager of the department to stop the production of that unit for some time, and instructed the incoming inspection to check the value of a particular type of carbon composition resistor which was used in the sub-assembly. He also asked the incoming inspection to check the stock of that particular resistor which was in store. To his utter surprise it was observed that some of the resistors had exceeded the tolerance limit to a great extent. Investigation revealed that this had happened in the storage itself. There are many more instances like this where the timely intervention of the design and development department has helped to locate the fault which had either been overlooked earlier or had developed in storage.

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